Speaker		Title	Abstract
		AGN Cosmology	
Roberto	**Gilli**	**AGN at hight redshift, a multi-frequency view**	I will review the most recent observational results on the population of high redshift accreting black holes, from AGN at z~3 up to the most distant QSOs at z>6. I will discuss the physics and demographics of these systems, highlighting open problems and emphasizing the importance of a truly multi-frequency approach. Finally I will discuss possible research lines to be pursued in the next future on this subject.
Elisabeta	**Lusso**	**AGN as cosmological probes**	I will review previous methods that have tried to employ active galactic nuclei to measure cosmological parameters. I will introduce a novel technique able to test the cosmological model using quasars as “standard candles” by employing the non-linear relation between their intrinsic UV and X-ray emission as an absolute distance indicator.
Rosa	Valiante	From the first stars to the first SMBHs	We investigate the nature and origin of the first super-massive black holes at redshift larger than 5 by means of an improved version of the semi analytical model GAMETE/QSOdust. In this study, we model the formation of the progenitors (seeds) of the first super-massive black holes along host galaxies hierarchical assembly. Low-mass seed black holes (~100 Msun) form as remnants of massive (260-300 Msun), population III stars, the so-called light seeds, while intermediate mass black holes (10^4 - 10^5 Msun), the so-called heavy seeds, arise from the direct collapse of gas in metal poor (Z<Zcr) halos exposed to a strong H2 photo-dissociating Lyman Werner flux. I will present a detailed analysis of the role of light and heavy seeds in the formation of a ~10^9 solar mass black hole at redshift z~6.4, consistently modeling the evolution of the environment out of which they form and of the chemical properties (metals and dust) of their host galaxies.
Barbara	Balmaverde	The primordial environment of SMBHs: the J1030 field around a quasar at z=6.3.	In recent years, with the goal of understanding the large scale structure around high-z QSO, we have obtained deep r,i,z, band imaging at Large Binocular Telescope (LBT) and Y and J band at CFHT Telescope of the field around the quasar SDSSJ1030+0524 (z=6.3). I present here some results, in particular the photometric catalogue of the sources, the selection process of Lyman break galaxies in the QSO halo and the main properties of these galaxies.
Edwige	Pezzulli	Super-Eddington growth of the first black holes	The formation and growth of the first super massive black holes (SMBHs) at z ~ 6 is a subject of intense debate. If black holes grow at their Eddington rates, they must start from high-mass seeds, (Mseed ~10^4 -10^5 Msun), formed by direct collapse of gasHere I will consider an alternative scenario where remnant of population III stars, (M ~ 100 Msun), can grow at super-Eddington rates via radiatively inefficient slim accretion disks. In Pezzulli et al., (MNRAS 2016), we use an improved version of the cosmological, data-constrained semi-analytic model GAMETE/QSODUST. We follow, for each progenitor present in the simulation, the evolution of nuclear BH, gas cooling, disk and bulge formation of their host galaxies together with the star formation, SNe/AGN feedback and chemical and dust enrichment. By adopting SDSS J1148+5251 at z=6.4 as a prototype of luminous z=6 quasars, we find that ~ 80% of the SMBH mass of J1148 is provided by super-Eddington gas accretion, which can be sustained down to z ~ 10 in dense, gas-rich environments, and the BH progenitors of the final SMBH evolve in symbiosis with their host galaxiesWe reproduce all the observed quantities of J1148, also predicting an AGN-driven mass outflow rate at z=6.4 broadly consistent with the radial profile inferred from CII observation by Cicone et al. 2015. Interestingly, find that ~20% of J1148 progenitors at z=7.1 have BH luminosities and masses comparable to ULAS J1120, suggesting that the most distant quasar ever observed may be one of the progenitors of J1148.

Enrico	Piconcelli	X-ray properties of hyper-luminous quasars	The systematic exploration of hyper-luminous (log LBol > 47) quasars shining at the golden epoch of AGN activity (i.e. z~2-4) offer the opportunity of overcoming the luminosity bias in the exploration of the accretion phenomenon. The WISE All-Sky Survey allowed to spot the most luminous quasars in the universe. In this talk, we will present the results of our on-going study of the XMM/Chandra/NuSTAR observations of WISE-selected hyper-luminous quasars regardless of the amount of their obscuration (i.e. both blue and heavily-reddened). We report on the correlations between the X-ray and Optical, UV and MIR properties, and on the behavior of the X-ray bolometric correction at the brightest end of the luminosity function. We find that WISE-selected hyper-luminous quasars show much lower X/Opt flux and X/MIR luminosity ratios than those of AGN typically studied so far. This ‚ÄúX-ray weakness‚Äù can be a key ingredient for accelerating powerful ionized outflows (pervasively detected in the UV/optical band) and, furthermore, radiation-driven winds can be effective in destroying the X-ray corona and quenching the X-ray emission.
Angela	Sandrinelli	The Quasar Pairs Environment at z~0.5	We analyze the environment of a sample of 20 quasar physical pairs at 0.4<z<0.65 in order to investigate the link between QSO activity and their environments. In particular we aim to explore if QSO that are embedded the same galaxy environment (projected distance < 0.5 Mpc) inhabit different environments than isolated QSO of similar luminosity. The galaxy environments of QSO pairs as derived from SDSS imaging data is compared with a larger sample of isolated QSO matched in terms of redshift and luminosityFrom the comparison of the two samples we find the the galaxy density at 250 kpc from the QSO that are in pairs is about a factor 2 larger than that of isolated QSO. In addition we also complement these imaging study with high quality optical spectroscopy gathered at GTC in La Palma to get info on the dynamic of the systemsImplications of these results based on a small (but ‚Äúcomplete‚Äù) sample are briefly discussed.
	Black holes and host galaxies		
Giulia	**Rodighiero**	**An IR view of Accretion and Star formation**	**TBD**
Angela	**Bongiorno**	**BH host galxies: mass functions and scaling relations**	Supermassive black hole growth, nuclear activity, and galaxy evolution have been found to be closely related. In the context of AGN-galaxy coevolution, I will discuss about the relation found between the host galaxy properties and the central BH and I will present the latest determination of the host galaxy stellar mass function (HGMF), and the specific accretion rate distribution function (SARDF), derived from the XMM-COSMOS sample up to z~2.5, with particular focus on AGN feedback as possible responsible mechanism for galaxy quenching.
Federica	Duras	The WISSH Project: Broad-band SED of Hyper-luminous WISE-selected Quasars at z~3	Models and observations indicate that the efficiency of driving energetic winds and the momentum fluxes of galaxy-scale outflows increases with AGN luminosity: indeed understanding the coupling between the nuclear energy output and the host galaxy is an issue particularly relevant for the most luminous quasars. We have analyzed the spectral energy distribution of the WISE/SDSS-selected hyper-luminous (log LBol > 47.3) quasar (WISSH) sample. Through multi component SED fitting we have been able to disentangle the different contributions of the nuclear source and of the host galaxy and derive relevant physical quantities such as extinction, AGN bolometric and monochromatic luminosities, Eddington ratios and SFR. I will present the results of this work, with particular focus on the 16 WISSH quasars for which a broad-band coverage is available up to the FIR thanks to the Herschel/SPIRE photometric data.
Manuela	Bischetti	The WISSH Quasars project: Probing the AGN/galaxy co-evolution in the most luminous quasars	The WISE/SDSS selected hyper-luminous (WISSH) quasars survey is an extensive multiband observing program (from millimeter wavelengths to hard X rays) to investigate the role of nuclear activity in SMBH-galaxy self-regulated growth via extended outflows. Our ongoing project is designed to accurately constrain both AGN and host galaxy ISM properties in a large sample of ~ 90 broad-line quasars at the brightest end of the AGN luminosity function (L_bol > 1e14 L_sun) and at the peak of their number density (z ~ 2 - 4)I will review the most relevant results obtained to date with emphasis on the discovery of extremely powerful (up to ~ 4% of L_bol) ionized outflows, the relation between AGN properties (obscuration, luminosity and Eddington ratio) and large-scale winds, and the SED of these hyper-luminous quasars.

Anna	Feltre	Nebular emission from AGN in the ultraviolet/optical: linking observations and theory with new generation spectral models	Spectroscopic studies of AGN are powerful means of probing the physical properties of the ionized gas within them. In particular, forthcoming facilities such as JWST and the E-ELT, will provide rest-frame ultraviolet and optical spectra of the very distant AGN. To lay the groundwork for the interpretation of the revolutionary datasets, we have recently computed new photoionization models of the narrow-line emitting regions (NLR) of AGN and combined them with similar models of the nebular emission from star-forming galaxies. In this talk, I will first describe how new ultraviolet and standard optical spectral diagnostics allow one to distinguish between nuclear activity and star formation. I will then present how the nebular emission from both young stars and AGN can be coupled with a new set of cosmological hydrodynamical zoom-in simulations of massive galaxies to achieve a better understanding of black hole growth and galaxy evolution with cosmic time. I will also present an innovative Bayesian fitting code that can help us best interpret current, and future, spectro-photometric data on active galaxies. In particular, the implementation of AGN photoionization calculations within this fitting tool allows us to better understand the physical properties of the AGN NLR gas. I will conclude showing some results from a recent analysis on one of the most comprehensive set of optical spectra (from VIMOS/VLT) sampling the rest-frame ultraviolet range of ~90 type 2 AGN ($1.5 < z < 3$), drawn from the z-COSMOS deep survey.
Paolo	Padovani	The faint radio sky: radio astronomy becomes mainstream	Radio astronomy has changed. After years of studying rare, mostly non-thermal sources, i.e. radio quasars and radio galaxies, it is now reaching such faint flux densities that it detects mainly star-forming galaxies and the more common radio-quiet active galactic nuclei. I follow the transformation of radio astronomy and describe its relevance for a number of hot topics in extragalactic astronomy. The future prospects of the faint radio sky are very bright, as we will soon be flooded with survey data. This talk is based on a recent review paper I am currently writing for Astronomy and Astrophysics Review.
Ivan	Delvecchio	Properties and evolution of radio-AGN hosts since z~4	We analyse the multi-wavelength properties of about 7500 radio (3-GHz) selected sources in the COSMOS field to investigate the impact of AGN activity on the integrated properties of their hosts. Two main classes of AGN are identified: radiatively-efficient AGN, by combining X-ray, mid-IR diagnostics and SED decomposition, and radiatively-inefficient AGN, that show up only in radio. Interestingly, we find significantly distinct galaxy properties for the two AGN classes, as a function of redshift. At $z<1.5$, radiatively-inefficient AGN are typically found in more massive and less star-forming galaxies than radiatively-efficient AGN, while at higher redshift we observe a possible reversal of their stellar mass distributions. We interpret these trends in the context of the anti-hierarchical growth of AGN host galaxies, with a particular focus on the role of AGN feedback over cosmic time in radio-selected samples.
Daria	Guidetti	AGN populations in GOODS-N through eMERGE ultra-deep JVLA observations	Assessing the faint AGN component in deep radio fields, will provide an important tool to understand the role of nuclear activity in distant galaxies and its possible co-evolution with star-formation processes, as radio wavelengths are not affected by dust extinction and/or gas absorption. In my talk I will report about the e-MERLIN Galaxy Evolution Survey (eMERGE, PI: Muxlow), a legacy project which aims at undertaking a spatially-resolved study of AGN and star formation processes up to high redshift in a 30 arcmin diameter field in the GOODS-N region, through ultra-deep (sub-microJy rms), sub-arcsec (50-500 mas) imaging at 1.4 and 5 GHz, using combined JVLA and eMERLIN observations. I will focus on the study of a sample of GOODS-N galaxies (300 objects) selected at 1.4 GHz to constrain the presence of AGN cores in moderate-to-high redshift ($1<z<5$) galaxies, via radio spectra-morphological analysis with the additional help of multi-wavelength information.

Chiara	Circosta	Heavily obscured AGN: an ideal laboratory to study the early coevolution of galaxies and black holes	Obscured AGN are a crucial ingredient to understand the full growth history of super massive black holes and the coevolution with their host galaxies, since they constitute the bulk of the BH accretion. In the distant Universe, many of them are hosted by submillimeter galaxies (SMGs), characterized by a high production of stars and a very fast consumption of gas. Therefore, the analysis of this class of objects is fundamental to investigate the role of the ISM in the early coevolution of galaxies and black holesWe collected a sample of six obscured X-ray selected AGN at z>2.5 in the CDF-S, detected in the far-IR/submm bands. We performed a multiwavelength analysis in order to characterize their physical properties, as well as those of their host galaxies (e.g. column density, accretion luminosity, stellar mass, SFR, dust and gas mass). I will present the results of the X-ray spectral analysis of these sources based on the 7Ms Chandra data - the deepest X-ray observation ever carried out on any field - along with their broad-band spectral energy distributions (SEDs), built up using the public UV to far-IR photometry from the CANDELS and Herschel catalogs. By comparing the column density associated with the ISM (estimated measuring the size of the system) with that obtained from the X-ray data, it is possible to understand whether the ISM in the host galaxy may be able to produce a substantial part of the observed nuclear obscuration.
Viola	**Allevato**	**Clustering properties of Chandra COSMOS Legacy AGN**	I'll present here a study on the clustering properties of Chandra COSMOS-Legacy AGN. This new catalog is the largest available sample of X-ray selected AGN for clustering studies. The 2pcf has been measured at z>3 for the first time using X-ray data with high accuracy, using new techniques based on photometric redshift in the form of probability distribution functions in addition to any available spectroscopy. The results will be compared to previous studies using optically selected quasars and interpreted in terms of AGN triggering mechanisms.
Manuela	Magliocchetti	Clustering radio-selected AGN and star-forming galaxies up to redshifts z=3	We present the clustering properties of a complete sample of 957 radio sources detected by the VLA-COSMOS survey with radio fluxes brighter than 0.15 mJy. Based on their radio-luminosity, these objects have been furtherly divided into two populations of 642 AGN and 246 star-forming galaxies. Investigations of their clustering properties return values for the minimum masses of dark matter haloes capable to host at least one of such sources of Mmin=10^13.6 Msun for radio-selected AGN and Mmin=10^13.1 Msun for radio-emitting star-forming galaxies. Comparisons with previous works imply an independence of the clustering properties of the AGN population with respect to both radio luminosity and redshift. We also investigate the relationship between dark and luminous matter in both populations. Our results indicate a larger relative stellar content in the star-forming population with respect to AGN and also clearly show the cosmic process of star-formation build-up as one moves towards the more local universe. Comparisons between the observed space density of radio-selected AGN and that of dark matter haloes shows that about one in two haloes is associated with a black hole in its radio-active phase. This suggests that the radio-active phase is a recurrent phenomenon.
Fabio	**Fontanot**	Interpreting the possible break in the black hole-bulge mass relation	Recent inspections of local available data suggest that the relation between the stellar mass of spheroids and that of the supermassive BH residing at its center shows a break. We investigate the physical mechanisms responsible for the change in slope of this relation, by comparing data with the results of the semi-analytic model of galaxy formation MORGANA, which already predicted such a break in its original formulation. Our results show that a model of stellar feedback that produces stronger outflows in star-forming bulges than in discs will naturally produce such a break.

Federica	Ricci	The BH mass - K-bulge luminosity relation in type 2 AGN	According to the current models of galaxy evolution in a hierarchical cosmology, low mass Black Holes (<10^7 Msun) at low redshift contain clues about the formation of the first Black Holes and Galaxies. Moreover, as they extend the dynamic range of the BH-mass/galaxy scaling relations to extreme values, they are extremely useful in constraining AGN/galaxy co-evolution models. In the past years, in the framework of the verification of the AGN unified model, there have been several attempts to detect faint broad emission lines in type 2 AGN with both NIR and polarised spectroscopy. We here present the new results from a systematic study performed using deep NIR (VLT and LBT) spectroscopy of a sample of ~40 AGN2, drawn from the complete SWIFT/BAT 70-month hard (14-195 keV) X-ray selected sample. Thanks to our single epoch relation calibrated on unbiased quantities (hard X-ray luminosity and Pabeta line width), we have been able to directly measure in a virial way the BH mass of AGN2Our recent findings allowed us to measure for the first time the Eddington ratio distribution and the local Black Hole mass - K-bulge luminosity relation of AGN2. Our results will be discussed in the AGN/galaxy coevolutionary scenarios.
Diego	Tuccillo	Shallow and Deep learning, 2 neural network architectures for 2 astronomical applications	Data mining techniques are a very effective tool to deal with the selection of quasar candidates from large-area surveys. Data mining not only renders dealing with a sheer volume of data simpler and more automatic, but it also improves the efficiency and completeness of the candidates targeting In particular Artificial Neural Networks are one of the most studied, powerful and flexible classification methods. The biggest advantage of neural networks is that they are general, they can handle problems with many parameters and they can work well even when the distribution of objects in the N-dimensional parameter space is very complex.In this talk we present results of a “shallow"" ANN classifier to select quasar candidates extracted from the data provided from the new generation of large area surveys in the optical and near/intermedia infrared like VISTA, BOSS, WISE, PanStarr.Attempts to build automated methods to analyze galaxies morphologies have historically found difficulties in reaching the reliability required for scientific analysis. In spite of this historical unsuccess, the application in astronomy of “deep learning"", the recent big stride in the field of machine learning for patter recognition, has made automated approach much more reliable and promising (Dieleman et al. 2015; Huertas-Company et al. 2015). Deep learning algorithms are contrasted with shallow learning because they use deep architecture models with multiple layers of non-linear transformations, that allow multiple levels of representation and abstraction. In this talk we present preliminary results on the use deep learning neural network to analyze the morphology of the AGNs host-galaxies.
Disks, Winds and outflows			
Elisa	**Costantini**	**Accretion disks and Warm absorbers**	Outflows of highly ionized gas are seen in at least 50% of active galactic nuclei. Their physical parameters (e.g. degree of ionization) vary often with time, suggesting an origin near the central engine. Despite the vast literature on the phenomenology of this multi-component gas, little is known on their location, mass and their launching mechanism. These uncertainties have consequences for our understanding of cosmic feedback. In this talk I will review the state of the art of AGN outflows as seen in both the UV and X-ray band. I will also illustrate how future missions will be crucial for solving the still many open issues in this field.
Viviana	**Casasola**	**Molecular gas and Nuclear Activity in galaxies with ALMA**	In pre ALMA epoch, studies of molecular gas in Active Galactic Nucleus (AGN) circumnuclear regions were hampered by insufficient spatial resolution and sensitivity to trace the gas inside a 100 pc radius. The first cycles of ALMA have already offered the opportunity, for the first time, to examine the ultimate contenders of nuclear gas fueling, (nuclear bars, dynamical friction, and/or turbulent viscosity) improving spatial resolution and sensitivity. I will present ALMA molecular gas maps in nearby active galaxies at the unprecedented spatial resolution of ~5-20 pc. These data are fundamental to test and refine the scenario of feeding and feedback of AGN, and constrain black hole models. ALMA is also allowing us to tackle and resolve the molecular torus below 10 pc.

Giustina	Vietri	The WISSH project (II): Powerful ionized outflows in hyper-luminous quasars and the AGN/galaxy coevolution at its extreme	(On behalf of the WISSH collaboration) The WISE/SDSS-selected hyper-luminous quasar (WISSH) survey is an extensive multi-band observing program to investigate the role of nuclear activity in SMBH-galaxy self-regulated growth via extended outflows. Our ongoing project is designed to accurately probe the relationship between nuclear and host galaxy ISM properties in a large sample of ~90 quasars at the brightest end of the AGN luminosity function (log LBol > 47.3) and at the peak of their number density (z~2.5-3.5)We will report on the discovery of highly accreting (0.3-3Ledd), ten billion solar masses SMBHs being able to produce very powerful (up to ~ 4% of L_bol) ionized outflows and accretion disk windsThe impact of AGN-driven feedback on their host galaxies will be also discussed
Demetra	De Cicco	C IV Broad Absorption Line Variability in QSO Spectra	We present the results of our study of C IV broad absorption line (BAL) variability in the spectra of more than 1500 QSOs from several SDSS I-III surveys up to BOSS. Absorption lines in QSO spectra are due to outflowing winds which originate from the accretion disk, at a distance of about 0.01-0.1 pc from the central super-massive black hole (SMBH). Winds trigger the accretion mechanism onto the SMBH removing angular momentum from the disk and, since they evacuate gas from the host galaxy, they are believed to play a fundamental role in galaxy evolution. Absorption lines can be classified on the basis of their width and of the observed transitions, and their equivalent width can change on timescales from months to years, due to variations in the covering factor and/or in the ionization level. We analyzed the largest sample ever used for such kind of studies. We find that the fraction of disappearing BALs is three times larger than the one found in previous works. Strong evidence is found for a coordinated variability in spectra with multiple BAL troughs which may be interpreted in terms of disk-wind rotation, and/or variations in the physical status of the shielding gas. We also find that, in spectra with multiple BAL troughs, the disappearing ones are generally those with the highest central velocity.
Michele	Perna	An X-ray/SDSS AGN sample - Observational characterization of the outflow phase	Powerful ionised AGN-driven outflows, commonly detected both locally and at high redshift, are invoked to contribute to the co-evolution of SMBH and galaxies through feedback phenomena. Our recent works (Brusa+2015; 2016; Perna+2015a,b) have shown that the XMM-COSMOS targets with evidence of outflows collected so far (~10 sources) appear to be associated with low X,Äìray kbol corrections (Lbol /LX ,âà 18), in spite of their spread in obscuration, in the locations on the SFR-Mstar diagram, in their radio emission. A higher statistical significance is required to validate a connection between outflow phenomena and a X-ray loudness. Moreover, in order to validate their binding nature to the galaxy fate, it is crucial to correctly determine the outflow energetics. This requires time consuming integral field spectroscopic (IFS) observations, which are, at present, mostly limited to high luminosity objectsThe study of SDSS data offers a complementary strategy to IFS efforts. I will present physical and demographic characterization of the AGN-galaxy system during the feedback phase obtained studying a sample of ~ 500 X-ray/SDSS AGNs, at z<0.8. Outflow velocity inferred from [OIII]5007 emission line profile has been related to optical (e.g., [OIII] and bolometric luminosities, Eddington ratio, stellar velocity dispersion) and X-ray properties (intrinsic X-ray luminosity, obscuration and X-ray kbol correction), to determine what drives ionised winds. Several diagnostic line ratios have been used to infer the physical properties of the ionised outflowing gas. The knowledge of these properties can reduce the actual uncertainties in the outflow energetics by a factor of ten, pointing to improve our understanding of the AGN outflow phenomenon and its impact on galaxy evolution.

Margherita	Talia	UV ISM absorption lines as outflows tracers: a comparison between AGNs and SFGs	To reproduce the properties of galaxies in the local Universe, as well as the scaling relations between host galaxies and black holes properties, many galaxy formation models invoke the presence of fast and energetic winds extending over galaxy scales. These massive gas outflows can be powered either by star-formation (SF) or AGN activity, though the relative dominance and efficiency of the different mechanisms is not yet fully understoodIn the last decade much effort has been put in the search for observational evidence of such phenomena, especially at the peak of both SF and AGN activity through cosmic time (1<z<3), in an attempt to explain the rapid quenching of SF and the link between the evolution of AGNs and their host galaxies. Spectroscopy at different wavelengths is the most powerful tool to find and investigate outflows. Blue-shifted inter-stellar medium (ISM) absorption lines in the UV regime, as well as broad, blue-shifted profiles in optical emission lines have been observed in galaxies at all redshifts and are usually interpreted as evidence of fast material moving towards our line of sight. More recently, especially thanks to new facilities like ALMA, outflows are being observed also in neutral and molecular gasIn order to study the differences and possible synergy between the two main driving outflow mechanisms (AGN or SF activity) and to understand the role that outflows might play in SF quenching and galaxy evolution, we collected a large sample of AGNs and SFGs at z>1.7 from large optical spectroscopic surveys (zCOSMOS, VUDS, ESO public surveys), complemented with HST imaging, X-ray (Chandra) and IR data. The richness of available data for our sample allowed us to map a large portion of the physical parameters space. We concentrated our analysis on the ISM absorption lines in the rest-frame UV wavelength range. Through stacking tecniques we studied the relation between such lines and AGN and SFG properties. I will present our results (Talia et al. 2016, in prep.) and discuss how they are contributing to uncover the key role played by outflows in galaxy evolution.
Giovanni	**Cresci**	**Galaxy-wide outflows & feedback**	Negative feedback from active galactic nuclei (AGN) is considered a key mechanism in shaping galaxy evolution. Fast, extended outflows are frequently detected in the AGN host galaxies at all redshifts and luminosities, both in ionized and molecular gas. However, these outflows are only potentially able to quench star formation, and we are still lacking decisive evidence of negative feedback in action. I will briefly review the main evidences for AGN driven outflows in galaxies at different scales, as well as the evidences we have so far of feedback effects on the host galaxy. Finally, I will discuss the possible effects of AGN outflow induced star formation ("positive feedback"), and the observations we have so far supporting this scenario.
Fabrizio	Nicastro	Galactic Archaeology via Relics of Nuclear Accretion Events	I will report on the presence of large amounts of million-degree gas in the Milky Way's interstellar and circum-galactic medium, and will show that this gas: (1) permeates both the Galactic plane and the halo, (2) extends to distances larger than 60-200 kpc from the center, and (3) its mass is sufficient to close the Galaxy's baryon census.I will also show that a vast, ~6 kpc radius, spherically-symmetric central region of the Milky Way above and below the 0.16 kpc thick plane, has either been emptied of hot gas or the density of this gas within the cavity has a peculiar profile, increasing from the center up to a radius of ~6 kpc, and then decreasing with a typical halo density profile. This, and several other converging pieces of evidence, suggest that the current surface of the cavity, at 6 kpc from the Galaxy's center, traces the distant echo of a period of strong nuclear activity of our super-massive black-hole, occurred about 6 Myrs ago.
Giacomo	Venturi	The MAGNUM survey: outflows and star formation in nearby Seyfert galaxies with the integral field eye of MUSE	In this talk I will present the first results from the MAGNUM survey (Measuring Active Galactic Nuclei Under MUSE Microscope), which is aimed at exploiting the unique combination of large field of view and spectral range provided by MUSE for detailed physical studies of the interaction of AGN outflows with their host galaxies and of the connection between AGN activity and star formationData have been obtained for about ten galaxies so far, including the famous NGC 1068, NGC 1365, Circinus and NGC 4945. MUSE has allowed us to map the AGN-driven outflows in several different emission lines revealing a clear kinematical and spatial structure related to the ionisation cone and which depends on line excitation. Further insight has been gained by comparing emission line maps from MUSE with high resolution X-ray images from Chandra. Finally, possible evidence for star formation triggered by AGN outflows has been found.
The variable central engine			
Fabio	**La Franca**	**BH mass (and spin) determination**	The results on the measure of the Super Massive BH (SMBH) masses will be presented from a historical point of view. Starting from the discovery of the M_BH-galaxy relations, the latest results on the AGN SMBH mass function, evolution of the M_BH/M_star relation and the AGN2 M_BH measures will be discussed. The effects of the uncertainties and of the possible presence of selection biases will also be illustrated.

Tristano	**di Girolamo**	**Gravitational waves from supermassive Black Holes**	In this talk, I will present the first direct detections of gravitational waves from binary stellar-mass black hole mergers during the first observing run of the two detectors of the Advanced Laser Interferometer Gravitational-wave Observatory, which opened the field of gravitational-wave astronomy, and then discuss prospects for observing gravitational waves from supermassive black holes with future detectors.
Elena	Dalla Bontà	AGN Space Telescope and Optical Reverberation Mapping project	Reverberation mapping is a tomographic technique that can be used to determine the structure and kinematics of the broad-line emitting region at the center of active galactic nuclei. By-products of these investigations are the masses of the central black holes and information about the structure of the accretion disk. I will show some of the most recent results from the AGN Space Telescope and Optical Reverberation Mapping (AGN STORM) project, which was built around 180 daily observations of the bright Seyfert 1 galaxy NGC 5548 with the Cosmic Origins Spectrograph on Hubble Space Telescope. AGN STORM included observations made with Swift, XMM, and several ground-based telescopes, including the 1.22-m telescope at Asiago Observatory. Elena Dalla Bonta` on behalf of the AGN STORM Team
Susanna	Bisogni	Structure and orientation of BLR in quasars	A comprehension of the geometry and kinematics of the BLR in quasars is essential to understand the role of quasars in galaxy evolution through accretion and feedback processes, as well as black hole growth. In particular, virial mass estimations depend upon the interpretation of the broad line region kinematics inferred through the emission line properties. We have analyzed the behavior of narrow and broad lines in a mutual framework as a means to investigate the morphology and kinematics in the inner regions of Active Galaxies (AGN). Assuming AGN structure follows the Unified Model, at least to first order, we have searched for connections between the spectroscopic emission coming from different AGN components, i.e., the NLR and BLR. I will discuss how the most prominent narrow line in the optical spectrum, [OIII], can be used to infer information about the BLR, regarding inclination and its physical structure. Information about orientation can shed light on both the ubiquity of the Unified Model as well as provide geometrical corrections to virial black hole mass estimations. Additionally, the connection between the characteristics of the narrow and broad emission can be used to investigate structural properties of the broad and narrow lines regions and how the different emission line regions contribute to a single-epoch emission line that samples all line-of-sight gas. With a specific focus on CIV, we use characteristics of [OIII] to disentangle emission components, some of which arises in regions where the gas velocities should not be contributing to the virialized velocity measurement for black hole masses, which can thus improve the accuracy of mass estimates.
Alessia	Tortosa	Hot coronae in nearby Seyfert galaxies	The primary X-ray emission in AGN is believed to be produced by Comptonization of optical/UV disk photons scattered up to the X-ray band by a hot corona located above the accretion disk. The emitted spectrum is, at the first order, a power-law with a high-energy cutoff, where the photon index and the cutoff energy are directly related to the temperature and to the optical depth of the plasma of hot electrons responsible for the inverse Compton scatteringTo investigate the physical properties of the corona and provide constraints on its parameters, we have studied the broad band spectra of a sample of local Seyfert galaxies observed with NuSTAR (in coordination with XMM-Newton, Suzaku or Swift). We will discuss the general properties of the sample, and show a few particularly interesting cases.
Paolo	Soffitta	Opening a window on Active Galactic Nuclei: the polarimetric view in X-rays.	X-ray polarimetric missions, currently under study by ESA and NASA, can improve our current X-ray view of AGNs in the local Universe which are based on spectroscopic, imaging and timing analysis. I will discuss in this talk how these missions can probe the geometry of the matter around the black hole (from the X-ray emitting corona to more distant circumnuclear matter) as well as the structure and the emission of the jet in blazars and radiogalaxies.
Giulia	Mantovani	The relativistic Fe Kalpha line in Seyfert 1 galaxies	Relativistic iron lines are expected to be an ubiquitous feature in bright AGN. However, a significant fraction of object misses a relativistic line component. We investigated the physical reasons of its absence. To this aim we studied a sample of Seyfert 1 galaxies where controversial results on the presence of a relativistic line have been previously reported. I will show that high statistics is key to reveal the line: the relativistic Fe Kalpha line is detected at >95% confidence level in observations where the counts in the 5-7 keV energy band are >4 x 10^4. We also st udied the correlation between the relativistic line and the high energy reflection continuum, and explored whether evidences of light bending exist in the data.

Emanuele	Nardini	Discovery of transient iron fluorescence in the bare Seyfert Ark 120	We present the results from an X-ray observational campaign on the bare Seyfert galaxy Ark 120 jointly carried out with XMM-Newton, Chandra, and NuSTAR. The favourable line of sight to this source, devoid of any significant absorbing material, provides an incomparably clean view to the nuclear regions of an AGN, down to the the immediate surroundings of the radiatively efficient, accreting supermassive black hole. Here we focus on the nature, properties, and variability of the emission-line complex due to iron fluorescence detected in the 6-7 keV band. The narrow K-alpha feature from neutral iron at 6.4 keV is resolved by Chandra/HETG to a width of 5000 km/s, consistent with origin from the optical broad-line region. However, excess components are seen on both sides of this core. The excess emission map computed over the 7.5 days of XMM-Newton monitoring and the following, time-resolved spectral analysis show that both the red and blue features are highly variable on timescales of 10-15 hours. Any explanation (orbiting hotspots, coronal clumps, disc instabilities) requires a highly dynamic, inhomogeneous disc/coronal system. These observations thus prove the unique potential of a bare source like Ark 120 to better understand the physics of the accretion disc/X-ray corona system in AGN.
Barbara	**De Marco**	**X-ray variability in AGN**	Variability is one of the defining properties of active galactic nuclei (AGN). Significant flux variations are observed in different wavebands, and over a wide range of time scales. The X-ray band displays the fastest variability, pointing to an origin in very compact regions near the supermassive black hole. I will review our current understanding of X-ray variability in AGN, discussing scaling relationships and models for the origin of the observed flux variations.
Giuseppe	**Lodato**	**Recent advances in the theory of Tidal Disruption events**	In this talk, i will present some new advances in the theory of Tidal Disruption Events (TDE). TDEs occur when a star approaches a SMBH close enough to be torn apart by the black hole tidal field. The rapid accretion of the stellar debris produce a luminous, possibly super-Eddington flare, lighting up an otherwise quiescent black hole. In this talk, I will present some recent results concerning the formation and early evolution of an accretion disc formed by the stellar debris. The structure of the disc is strongly dependent on the thermal state of the gas, with efficient or inefficient cooling giving rise to either a thin disc or an extended torus/envelope surrounding the black hole. I will present the results of numerical simulations confirming this picture and including relativistic effects, which are essential for the formation of the disc. Finally, I will discuss the possible development of quasi periodic signals arising from Lense-Thirring precession around a spinning black hole.
Lorena	Hernandez-Garcia	Unveiling the physics AGN through X-ray variability	X-ray variability is very common in active galactic nuclei (AGN), but these variations may not occur similarly in different families of AGN. Our aim is to disentangle the structure of low ionization nuclear emission line regions (LINERs) compared to Seyferts by the study of their spectral properties and X-ray variations. We assembled the X-ray spectral parameters and variability patterns, which were obtained from simultaneous spectral fittings. Major differences are observed in the X-ray luminosities, and the Eddington ratios, which are higher in Seyferts. Short-term X-ray variations were only detected about a few Seyferts, while long-term changes are very common. Compton-thick sources generally do not show variations, most probably because the AGN is not accesible in the 0.5-10 keV energy band. The changes are mostly related with variations in the nuclear continuum, but other patterns of variability show that variations in the absorbers and at soft energies can be present in a few cases. We conclude that the X-ray variations may occur similarly in LINERs and Seyferts, i.e., they are related to the nuclear continuum, although they might have different accretion mechanisms. Variations at UV frequencies are detected in LINER nuclei. This is suggestive of at least some LINERs having an unobstructed view of the inner disc where the UV emission might take place, being UV variations common in them. This result might be compatible with the disappeareance of the torus and/or the broad line region in at least some LINERs.
Roberto	Serafinelli	Quasar X-ray spectral variability from the XMM-Newton serendipitous source catalogue	X-ray spectral variability analyses of Active Galactic Nuclei (AGN) with moderate luminosities and redshifts typically shows a behaviour. Such trend has not yet been investigated for high-luminosity AGNs, nor for a wider redshift range. We present an analysis of the spectral variability based on a large sample of quasars, measured at several different epochs, extracted from the latest release of the XMM-Newton Serendipitous Source Catalogue. Our analysis confirms a softer when brighter trend also for our sample, extending to high luminosity and redshift the general trend previously found. This results will be discussed in relation to current spectral models, such as intrinsic variations of the X-ray primary radiation, or superposition with a constant reflection component.

Riccardo	Middei	Ensemble X-ray variability of quasars at long time lags	We present the analysis of the ensemble structure function of the soft X-ray variability on a sample of about 3000 quasars. Our data are based on the observations of the ROSAT and XMM-Newton satellites, cross-correlated with the Sloan Digital Sky Survey Quasar catalogue. We measure for the first time the structure function up to a rest-frame time interval as large as 20 years (the longest time interval investigated through this type of study). The results of our analysis show that the X-ray variability of quasars still increases at these long time lags. This will be discussed in relation to the physical size of the emitting region.
Maurizio	Paolillo	Tracing the cosmological accretion history with X-ray variability	I will present recent results on AGN variability in the CDFS survey. Using over 10 years of X-ray monitoring and comparison with local AGNs we are able to constrain the variability dependence on BH mass and accreton rate, and use it to trace the accretion hisory of the AGN population up to z=3.
Challenges to the unified model			
Giovanni	**Miniutti**	**Challenges to the unified model: variable obscuration and changing type AGNs**	The basic idea behind the AGN unified model is that the large diversity of AGN observed properties can in fact be explained by a small number of physical parameters such as the ubiquitous presence of an obscuring circum-nuclear torus and the line-of-sight inclination. Despite the enormous success of the model, several observational evidences suggesting the need for modifications to the unified model have recently emerged. I will review some of the most relevant observational challenges to the unified model with a focus on the lessons learned from X-ray spectroscoy and variability analysis of AGN.
Giorgio	**Lanzuisi**	**Compton Thick AGN in multiwavelength surveys**	I will review the most recent results on the search for CT AGN through multi-wavelength surveys, and on the study of their host properties.
Fabio	Vito	The deepest X-ray view of high-redshift galaxies: constraints on low-rate black-hole accretion	We exploit the new 7 Ms Chandra observations in the CDF-S, the deepest X-ray survey to date, coupled with CANDELS/GOODS-S data, to measure the total X-ray emission arising from ~2000 galaxies at 3.5 < z < 6.5. This aim is achieved by stacking the Chandra data at the positions of optically selected galaxies, reaching effective exposure times of >=10^9 s. We detect X-ray emission from z ,àº 4 galaxies at 3 ,àí 5sigma, while no significant signal is detected from galaxies at higher redshifts. The stacking results are used to estimate the black hole accretion rate density (BHAD) and star -formation rate density (SFRD) at high redshift, assuming a range of prescriptions for X-ray emission due to X-ray binaries. We find that X-ray emission from our sample is likely dominated by processes related to star formation. Our results show that low-rate mass accretion onto SMBHs in individually X-ray-undetected galaxies is negligible, compared with the BHAD measured for samples of X-ray detected AGN, for cosmic SMBH mass assembly at high redshift. We also place, for the first time, constraints on the faint-end of the AGN X-ray luminosity function (logLX ,àº 42) at z > 4, with evidence for fairly flat slopes.
Paola	Marziani	A main sequence for quasars	The 4D eigenvector 1 parameter space defined by Sulentic et al. may be seen as a surrogate H-R diagram for quasars. As in the stellar H-R diagram, a source sequence can be easily identified. In the case of quasars, the main sequence appears to be mainly driven by Eddington ratio. A transition Eddington ratio may in part explain the striking observational differences between quasars at opposite ends of the main sequence. The eigenvector-1 approach opens the door towards properly contextualized models of quasar physics, geometry and kinematics. We review some of the progress that has been made over the past 15 years, and point out still unsolved issues.
Alessandra	Zaino	Revisiting mid-IR/X-ray selection of Compton-thick AGN in the WISE and 3XMM era A.Zaino et al.	An efficient diagnostic method to find local (z<0.1) Compton-thick AGN consists in selecting sources characterized by hard X-ray colors and low hard X-ray over mid-IR flux ratio. This has been done efficiently in the past using 2XMM and IRAS data (Severgnini et al. 2012). In this talk I will present my thesis work in which I tested this technique using the latest 3XMM and WISE data for the sample presented by Severgnini et al. I will also briefly discuss the X-ray spectral properties of all of those sources showing flux and/or spectral variability in the XMM-Newton observations.

Marco	Mignoli	Obscured AGN at z~2.2 from the zCOSMOS-Deep Survey. Selection and optical properties of a CIV-selected sample	The physics and demographics of high redshift obscured active galactic nuclei is still scarcely studied, and new samples of such objects, selected with different techniques, can provide useful insights into their physical nature. A sample of 90 narrow-line with 1.5< z < 3.0 was selected from the zCOSMOS-deep galaxy sample by detection of the high-ionization CIV 1549A emission line. The presence of this feature in a galaxy spectrum is indicative of nuclear activity, and the selection effectiveness has been also confirmed by ultraviolet emission line diagnostic diagrams. Taking advantage of the large amount of data available in the COSMOS field, the properties of the \civ-selected Type 2 AGN were analyzed, focusing on their host galaxies, X-ray emission, and UV emission line characteristics. Finally, the physical properties of the ionized gas in the Narrow Line Region have been investigated, combining the analysis of strong UV emission lines with the prediction from photoionization models.
Andrea	**Marinucci**	**Obscured AGN with NuSTAR**	The Nuclear Spectroscopic Telescope Array (NuSTAR) is the first orbiting telescope to focus high energy X-ray light above 10 keV. Compared to the previous generation of coded mask observatories, this change in technology provides NuSTAR with 10x sharper images and 100x improved sensitivityThe unprecedented spectral quality in the 3-80 keV band has provided unique information about the circumnuclear reflecting environment of AGNI will present and discuss results from the NuSTAR observations of nearby Obscured AGN in its first four years of science.
Francesco	Ursini	The XMM-NuSTAR monitoring of NGC 4593	We discuss results from a joint XMM-Newton and NuSTAR campaign on the Seyfert 1 NGC 4593, consisting of 5x20 ks observations, spaced by two days, performed in January 2015. The source shows a remarkable variability, both in flux and spectral shape, on time scales as short as a few ks. The spectrum clearly softens when the source brightens. The spectral analysis reveals (i) a warm absorber consisting of two components with distinct ionization state and velocity; (ii) two distinct reflection components: one consistent with being neutral and constant, one ionized and located within a few tens of gravitational radii from the primary source; (iii) a soft excess consistent with being due to warm Comptonization. We will also discuss the energetical and geometrical constraints obtained from physically motivated Comptonization models used to describe the broad-band (UV/hard X-ray) spectrum.
Luca	Zappacosta	The unobscured NuSTAR view of non-local obscured AGN	Cosmic X-ray Background (CXB) population synthesis models predict the existence of a consistent population of Compton Thick AGN expected to contribute for 10-25% to the CXB at 20-30 keV. NuSTAR, being the most sensitive X-ray observatory at energies > 10 keV, is capable of resolving 35% of the CXB at 8-24 keV and of obtaining a direct and almost unobscured view of heavily absorbed AGN up to $zsim2$. I will report on the results of our joint NuSTAR + Chandra/XMM spectral analysis of a bright 8-24 keV selected sample of AGN from the NuSTAR survey program.
Francesca	Panessa	Obscuration in radio galaxies	In order to investigate the role of absorption in AGN with jets, we have studied the column density distribution of a hard X-ray selected sample of radio galaxies, derived from the INTEGRAL/IBIS and Swift/BAT AGN catalogues. They represent ~ 7-10% of the total AGN population and are characterized by high 20-100 keV luminosities and high Eddington ratios. The radio morphology is typical of FRII galaxies and all of them have an optical classification and a measure of the column density. The observed fraction of absorbed AGN is around 40% among the total sample, and ~75% among type 2 AGN. The observed fraction of Compton thick AGN is ~2-3%. In this talk we will discuss the obscuration characteristics of radio galaxies compared to non-radio galaxies selected at hard X-rays.
	Jets, radio Loud AGNs and Blazars		
Marcello	**Giroletti**	**Invited review on multi-frequency view of Radio-loud AGNs**	I will present a review on the context and the most recent results about radio loud AGNs as seen in different parts of the electromagnetic spectrum, with an eye also to multi-messenger astrophysics and neutrinos in particular. I will focus on various topics of interest about RL AGNs, such as: the study of the physics of relativistic jets and particle acceleration, in particular through VLBI and gamma ray observations; the feedback to the host galaxy and on galaxy cluster scales; the possibility to probe distant and obscured environments.

Marco	**Chiaberge**	**The environment of radio-loud galaxies**	Radio galaxies are important objects. They are associated with the most massive black holes and thus with the most massive galaxies, and they are often located in clusters of galaxies. Studying radio galaxies at z>1 not only allows us to get insights on the mechanisms responsible for launching their powerful relativistic jets, but also to better understand important aspects of the formation and evolution of massive galaxies and clusters. In this talk, I will focus on the latest results from our successful HST snapshot survey of 3CR radio-loud AGN at z>1. We find strong evidence that galaxy mergers (and possibly black hole mergers) are intimately tied to the triggering mechanism for radio-loud AGN activity, while the same may not be true for other AGN types. The Mpc-scale environment of high-z powerful radio sources also shows interesting features when seen with HST. A significant number of these objects are located in rich groups/clusters, which may be showing the process of formation of the galaxy red sequence.
Ranieri D.	Baldi	The new class of FR0 radio galaxies	Recently, there are evidences that an emerging population of compact radio galaxies which lack of extended radio emission might be crucial in the comprehension of the radio-loud AGN population in the local Universe. In a pilot JVLA project, we observe a small but representative subsample of this population. The radio maps reveal compact unresolved or slightly resolved radio structures on a scale of 1-3 kpc. We find that these radio-loud AGN live in red massive early-type galaxies, with large black hole masses (~10^{8} solar mass), and spectroscopically classified as Low Excitation Galaxies, all characteristics typical of FRI radio galaxies which they also share the same (optical and X-ray) nuclear luminosity with. However, they are more core dominated (by a factor of ~30) than FRIs and show a clear deficit of extended radio emission. We call these sources 'FR0' to emphasize their lack of prominent extended radio emission. The emerging FR0 population appears to be the dominant radio class of the local Universe (~10 times more abundant than local FRIs). Considering their properties we speculate their possible origins and the possible cosmological scenarios they imply.
Eleonora	Torresi	Unveiling the nature of FR0 radio galaxies through X-rays	FR0 radio galaxies are compact sources that represent the bulk of the Radio-Loud AGN population, but they are still poorly understood. FR0s share similar nuclear and host properties with FRIs, but lack extended radio emission. Explanations for this are still under discussion. It could be that they are rapid intermittent radio galaxies or Radio-Loud AGNs with not efficient mildly or sub-relativistic jets. In this talk we present the X-ray analysis of a sample of 17 FR0s with the aim to exploiting the unique capability of X-rays to investigate the nature of the central engine of such sources. Successively, the radio, optical and X-ray properties of FR0s are compared to those of FRIs in order to explore possible differences/similarities between these two classes of radio galaxies. The results in terms of accretion and ambient medium are discussed.
Marco	Landoni	High redshift BL Lacertae objects	The discovery of BL Lacertae objects at high redshift is crucial in order to answer open questions about their controversial cosmical evolution and abundance in the non local Universe. They also represent a unique laboratory for investigating the opacity of the Universe in gamma-rays photons, due to interaction with the Extragalactic Background Light, particularly important in the case of sources at z > 1 where absorption becomes severe. The detection of bona fide BL Lacs at high redshift also allows to better understand they emission mechanism and energetics. Nevertheless, very few BL Lacs are known at z > 1.0. For this reason, we selected 28 high-z candidate BL Lac sources from catalogs of Plotkin et al 2010 and Shaw et al 2013 for spectroscopical observations with the 10mt GTC telescope equipped with OSIRIS at intermediate resolution (R = 1000). We report on the results obtained in our campaign focusing on the confirmation of BL Lac sources, and estimation of their cosmological abundance at high z.
Tullia	Sbarrato	Hidden parents of high-z blazars: quenching and dark bubbles	At redshift larger than 3 a relevant disagreement arises between the number of blazars (with jets aligned to our line-of-sight) and their parent population (with jets pointing elsewhere). We are missing the high-redshift blazars misaligned counterparts in our optical and radio surveys. Are we losing the optical nuclear emission or the extended radio flux? On one side, we could be missing the most misaligned sources, whose radio emission from their extended structures is likely quenched by the CMB energy density. But we also find a discrepancy between blazars and their slightly misaligned counterparts: we are missing slightly misaligned jets, too. This cannot be ascribed only to a quenched extended emission. I will show that an over-developed dusty structure can account for the missing misaligned population: bubbles of dust covering the nuclear region could completely obscure it. The jet can pierce the bubble, leaving visible the optical nucleus only if observing down the jet axis. This hypothesis would justify the relevant lack of parents, compared to the number of blazars that we keep finding at z>4.

Vincenzo	Antonuccio-Delogu	Backflows in and feedback from jet-powered AGNs.	During the propagation of a jet within the Interstellar medium of its host galaxy an expanding cavity filled with hot, turbulent gas forms, within which the jet itself propagates. We have performed a series of numerical experiments aiming at studying the large scale circulation within this jet-cocoon system. The gas advected by this backflow has a very low angular onentum and ends up in the central accretion region, where the Accretion Dominated Accretion Flow (ADAF) and the thin disc coexist. This gas has a high specific entropy, and it can heat and compress the ADAF. We show that after about 5 Myr. this backflow raises the magnetic flux and thus the jet's power. The acceleration of the terminal part of the jet results in a diminution of the backflow and then of jet's power, creating a cycle which regulates accretion on the BH. This self-feeding mechanism has typica time scales comparable of ~ 15-20 Myr, comparable to the observed AGNs duty cycles.
Gabriele	Bruni	Studying AGN jets at extreme angular resolution: results from the RadioAstron polarization key science project	RadioAstron is a 10m antenna orbiting on the Russian Speckt-R spacecraft, launched in 2011. Performing radio interferometry with a global array of ground telescopes, it is providing record angular resolution. The Key Science Project on AGN polarization is exploiting it to study in great detail the configuration of magnetic fields in AGN jets, and understand their formation and collimation. To date, the project has already achieved the highest angular resolution image ever obtained in Astronomy, and detected brightness temperatures exceeding the ones predicted by theory of AGN.
Stefano	Ciprini	20 years of observing campaigns of OJ 287: the black hole binary model as witness of the validity of General Relativity	A peculiar and controversial phenomenology is the periodicity of AGN and blazars. A representative case study with multifrequency radio-optical and X-ray data by Swift is presented, namely the BL Lac object OJ 287. The source is extensively monitored at radio and optical bands since 90's, with also coordinated intensive multifrequency campaigns. The data obtained during the last two observing multifrequency campaigns of 2004-2007 and 2015-2016, allowed to put some indirect tests of the General Relativity, under the assumption that the driving model is a binary supermassive black hole system with sub-parsec separation.
Francesco	Verrecchia	Swift/UVOT long-term monitoring of OJ287 @ ASDC	In the last years the Swift mission monitoring of non-GRB sources has become an essential tool in multi-frequencies time-domain studies. The ASI Science Data Center (ASDC), which hosts one of the three official Swift data archives and was deputy for the X-ray Telescope (XRT) Deep and Serendipitous surveys, has a long experience on Blazar multi-wavelength campaigns and has recently participated to various campaigns contemporary to observations of new space missions, such as Planck and NuSTAR (Balokovic et al 2016, Furniss et al. 2015, Giommi et al 2012). Since 2006 at the ASDC we have started an activity of UltraViolet Optical Telescope (UVOT) Blazar image processing. The dedicated standard processing procedure of UVOT images, using official software and calibrations, has the goal to add UVOT fluxes to source Spectral Energy Distributions (SEDs) and also support variability studies with comparison to X and gamma-ray data, even on the intra-observation time-scale. Currently data of about 430 sources have been processed, and results have been used in recent papers, such as those on Mkn 421 (Balokovic et al.2016) and OJ 287. The OJ287 UVOT image complete data processing is updated at each observation campaign and results have been published in some survey papers. The 2015 observations have been included in the internal long-term monitoring of the source and considered in the recent multi-frequency study Valtonen et al.(2016) of the new optical-UV outburst of the 12 years cycle, with comparison to the ground optical data and the contemporaneous Swift X-ray ones. We will report the results obtained with UVOT data.

Vincenzo	Galluzzi	Multi-frequency polarisation measurements of PACO radio sources	Active Galactic Nuclei (AGN) inner regions, poorly characterized so far at frequencies above 20 GHz, can now be studied through their emission and magnetic field properties by means of multi-frequency and multi-epoch polarimetry at centimetric and millimetric wavelengths. AGNs also constitute the main foreground for cosmic microwave background radiation on scales smaller than 30 arcmin up to 100 GHzWe present the analysis of high sensitivity polarimetric observations (< 1 mJy) for a complete sample of 106 compact extragalactic radio sources drawn from the faint (> 200 mJy at 20 GHz in total intensity) Planck-ATCA Co-eval Observations (PACO) catalogue, performed with the Australia Telescope Compact Array (ATCA) at 7 frequencies, over the 1.1-39 GHz frequency range. A currently ongoing ALMA follow-up might extend the analysis to 100 GHzPolarisation spectra of single sources cannot be simply inferred from total intensity ones, as different source components dominate the different emissions. On average, spectra steepen in both total intensity and polarisation at frequencies > 30 GHz. We characterized different behaviours in polarisation between sources peaking at cm (steep spectrum sources in our regime) or mm bands (flat and peaking spectrum sources) in total intensity: an increasing polarisation fraction with frequency emerges for steep spectrum sources and no significant trend is found for other spectral classes. Multi-epoch variability analysis (from 1.5 up to 12 yr time lags) is also presented.
Sara	Cutini	Quasi-periodic modulation from the gamma-ray blazar PG1553+113: a laboratory for jet physics	For the first time a gamma-ray and multi-wavelength nearly-periodic oscillation in an active galactic nucleus is reported by the Fermi Large Area Telescope (LAT). A quasi-periodicity in the gamma-ray flux (E>100 MeV and E>1 GeV) is observed from the well-known GeV/TeV BL Lac object PG 1553+113. The significance of the 2.18 +/- 0.08 year-period gamma-ray modulation, seen in 3.5 oscillation maxima observed, is supported by significant cross-correlated variations observed in radio and optical flux light curves, through data collected in the OVRO, Tuorla, KAIT, and CSS monitoring programs and Swift UVOT and XRT. As a BL Lac object, the mechanism driving the observed modulation could arise from the jet itself or from the process feeding the jet. It might point to interesting physical phenomena such as pulsational accretion flow instabilities, jet precession, or the tantalizing possibility of a milli-parsec scale binary super massive black hole system An intense multi-wavelength campaign aimed at unbiased monitoring of the source activity, from radio to VHE (E>100 GeV) gamma rays, started in 2015. It aims at revealing the physical scenarios that can account for such a variability pattern and at covering the next maximum, expected between the end of 2016 and beginning of 2017.
Rocco	Lico	Exploring the radio and gamma-ray connection in the 1FHL AGN sample	The first Fermi-LAT catalog of sources above 10 GeV (1FHL) is providing us for the first time with a large, deep and unbiased sample to gather gamma-ray data in the energy range 10-500 GeV, ideal for addressing both the connection between radio and VHE emission and the characterization of the most extreme gamma-ray sourcesIn this talk we focus our attention on the 1FHL blazars in the northern hemisphere, by providing new 5 GHz VLBA observations for the faintest members of the sample, for which we reveal compact radio emission (mas scale angular resolution), and brightness temperature values of the order of 2x10^10 K, which are close to the expected value for equipartition. Moreover, we propose new low-frequency counterparts for 14 unsassociated gamma-ray sourcesWe gather a final sample of 231 1FHL sources with high resolution radio observations. We find that overall the radio VLBI and hard gamma-ray emission (E>10 GeV) appears to be uncorrelated (r=,àí0.02), even when BL Lacs and FSRQs are considered separately, which is in contrast with what found when lower gamma-ray energies (E>0.1 GeV) are considered. However, when we take into account the single SED classes, high synchrotron peaked objects are the only blazar sub-class showing a strong and significant correlation (r = 0.60, p = 0.0032). We interpret and explain this correlation behavior within the framework of the blazar SED properties.

Giulia	Migliori	Young radio sources in gamma-rays : the detection of the CSO PKS 1718-649 with Fermi-LAT	We report the detection (> 5sigma) with Fermi-LAT of gamma-ray emission from the nearby (z = 0.014) radio galaxy, PKS 1718,àí649. This is the first detection in gamma-rays of a bona fide Compact Symmetric Object, a class of sources that are thought to represent the first stage in the evolution of extragalactic radio sources. A detection in the gamma-ray band is a clear indication of a non-thermal high-energy component and provides us with important insights on the physical conditions of expanding young radio sources. The symmetric radio morphology indicates that the source is seen at a large inclination angle and disfavors a contribution of the jet boosted emission. The steep gamma-ray spectrum and steady faint emission are consistent with the scenario of isotropic gamma-ray emission from the compact (<2pc) radio lobes, as proposed by models of expanding young radio sources. We discuss this interpretation and the perspectives for the detection of other young sources in gamma-rays.
Carolina	Casadio	The connection between the radio jet and the gamma-ray emission in the blazar CTA102 and the radio galaxy 3C120	We present multi-wavelength studies of the blazar CTA102 and the radio galaxy 3C120 during bright gamma-ray flares for both sources. The Fermi Large Area Telescope registered in September-October 2012 an extraordinary bright gamma-ray outburst in the quasar CTA102, and between December 2012 and October 2014 a prolonged gamma-ray activity in the radio galaxy 3C120. In both studies the analysis of Fermi data has been compared with a series of 43 GHz VLBA images from the VLBA-BU-BLAZAR program, providing the necessary spatial resolution to probe the parsec scale jet evolution during the high energy events. In the case of 3C120, in order to extend the observing period covered by radio data, we also used 15 GHz VLBA data from the MOJAVE sample. Although these two objects represent very different classes of AGN, we found they have similar properties during the gamma-ray events. The gamma-ray flares are associated with the passage of a new superluminal knot through the mm VLBI core, but not all ejections of new components lead to gamma-ray events and components responsible for the gamma-ray emission are not necessary bright components. Both in CTA102 and in 3C120, gamma-ray events occurred only when the new components are moving in a direction closer to our line of sight. We locate the gamma-ray dissipation zone a short distance downstream of the radio core but outside of the broad line region, suggesting synchrotron self-Compton scattering as the probable mechanism for the gamma-ray production.
TBD		**Neutrini da blazars**	
Luigi	Pacciani	High Energy Flares of FSRQs, is there a connection with the accretion disk luminosity?	High-Energy gamma-ray flares (E>10 GeV) of Flat Spectrum Radio Quasars (FSRQ) give us strong constraints on jet-physics, and on the surrounding-mediumWe performed the first study of these flares, examining FERMI-LAT archival-data, and triggering 40 ToO-observations from near-ir to TeV (e.g., for PKS 1441+25), at the occurrence of new flaresWe identified about 270 gamma-ray HE flares, and we already investigated peculiar and short-flares of 3C 454.3, CTA 102 and other 10 HE-flares, showing remarkably hard gamma-ray spectra. We argued that these flares originate at parsec distance from the Supermassive Black-Hole (distant scenario), possibly powered by magnetic-reconnections or turbulence in the flowFor the whole sample of 270 flares, we will show here spectral and temporal propertiesFurthermore, we compared the sub-sample of HE-flares with the whole sample of gamma-ray flares. We will show and discuss that jet luminosities and disks correlate not only on years averaged time-scales, but also during High-Energy gamma-ray flares (time-resolved within this investigation with time-scale of the order of 10 days or less).
Simona	Paiano	GTC optical spectroscopy of TeV blazars	We carried out an extensive spectroscopic campaign of blazars of unknown or uncertain redshift which are either detected in the TeV band by Cherenkov telescopes or good candidate as TeV emitters. We used the OSIRIS spectrograph at the Gran Telescopio of Canarias (GTC) at La Palma to secure high signal-to-noise ratio spectra at intermediate resolution in the range 3800-10000 Ang. These observations allow us to confirm the blazar classification, to find new redshift and/or to set stringent lower limits. The results are discussed in the context of emission modeling of TeV sources and are of importance for the characterization of the Extragalactic Background Light.

Antonio	Stamerra	Multi-wavelengths observations on the gamma-ray blazar PG1553+113 as a probe for geometrical periodical modulation.	New claims of periodic variability from gamma-ray blazars have been reported, possibly pointing at milli-pc SMBH binary systems. A modulation of ~2 year on 3.5 cycles was recently discovered with Fermi/LAT on the blazar PG1553+113 -- for the first time in gamma-rays with high significance -- and confirmed by optical lightcurves. Other possible gamma-ray periodic variations have been claimed on PKS 2155-304 and PKS 0537 by Sandrinelli et al. (2015, 2016). The interpretation of such periodicity, when confirmed with continuous observations in following years, is not straightforward. Emission from blazars is dominated by non-thermal emission from the jet; different processes in the jet or at its base, may lead to quasi-periodic emission. We used multi-wavelength (MWL) observations on PG1553+113 to investigate if the observed modulation can be explained with geometrical variations in the jet, possibly pointing to jet precession or to an helical pattern. The ongoing MWL monitoring campaign from radio to very-high energy gamma-ray bands, led by the MAGIC collaboration, will follow the maximum expected at the beginning of 2017, and will allow to set tighter constrains on underlying periodic processes.
Poster session			
Tiziana	Bassi	A journey in the radio galaxy IC 1531: through the linear scale, across the electromagnetic spectrum	We present a multi-scale and multi-frequency study of the radio galaxy IC1531 (z=0.026) with Chandra, XMM-Newton and Fermi. The Chandra image shows an X-ray core and 5 extended emission with the radio jet. The X-ray spectrum of the core is well fitted by a power law (Œì=2.2). The X-ray emission of the large scale jet is most-likely synchrotron emission, further confirming the low-power source classication. The gamma-ray analisys shows a 5-days variability, from which it is possible to estimate the size of the emitting region. We present a study of the spectral energy distribution of the core of IC1531 from radio to gamma-ray emission. The models allowed us to determine the nature of the gamma-ray emission and infer the jet kinetic power at sub-pc scales. The jet power at kpc scales is estimated from the total radio luminosity at 151 MHz. Finally, we compare the jet power with the disk luminosity. We discuss our results in terms of the formation and evolution of the jet.
Renato	Falomo	Properties of low z QSO from SDSS-S82 region.	Extensive QSO surveys carried out by SDSS have provided a very large sample of quasars both at low and high redshift. For low z objects it is possible to investigate their host galaxies and environments using directly the SDSS imagesWe have undertaken an extensive multiwavelength study of the a sample of about 400 quasars at z < 0.5 in order to characterize their environments at various scale-lengths. For a subsample of these QSO we have complemented the SDSS images with spectroscopy of the quasars and their close companion galaxies. We report here the main results of this study.
Didier	Fraix Burnet	A phylogenetic view of the Eigenvector 1 of quasars	A cladistic analysis on samples of low-z quasars (z<0.7) separates sources radiating at higher Eddington ratios values, as well as radio-quiet from radio-loud quasars. The analysis properly distinguishes also core-dominated and lobe-dominated quasars, in agreement with the basic tenet of Unification schemes, and suggests a black hole mass threshold for powerful radio emission. Considering that the black hole mass then provides a sort of "arrow of time" of nuclear activity, an evolutionary interpretation becomes possible if cladistic trees are rooted on black hole mass. More massive radio-quiet Population B sources at low-z become a more evolved counterpart of Population A i.e., wind dominated sources, to which at least part of the “local” Narrow-Line Seyfert 1s belong. In this scheme, powerful radio-loud sources may be seen as sources belonging to a most evolved quasar population.

Giulio	Violino	Star formation and obscuration in AGN: A sub-mm study of high-redshift mid-IR selected type-2 QSOs.	Star formation and obscuration in AGN: A sub-mm study of high-redshift mid-IR selected type-2 QSOs. The AGN unification model describes unobscured and obscured AGN (AGN1 and AGN2) as identical sources, with their different observed properties explained solely by orientation effects; as a result, it predicts no difference in the host galaxies. As an alternative, a second scenario has been proposed in which type-2 AGN represent an earlier stage in the life of AGN characterized by dust-enshrouded host galaxies which contribute to the obscuration and higher star formation activity, at least at earlier epochs. To test this scenario we employ Herschel data at three different wavelengths (250, 350, 500 um) to study the far-IR-to-submm properties of a sample of mid-IR selected type 2 QSOs at high redshift (1.5<z<4.5) from the FLS region (Martinez-Sansigre et al. 2005). We compare their properties to a matched sample of type-1 QSOs selected in the same field. Through SED fitting we are able to disentangle AGN and star-formation activity and consequently derive FIR luminosities of the two components, as well as SFRs and dust masses. We propose a picture in which intermediate-level radio activity in the core (pc scale) of AGN is linked to the obscuration of the nucleus (perhaps via a merger) since our AGN1 have systematically lower radio luminosities than our AGN2.
Riccardo	Nanni	X-ray properties of AGN at z > 5.5	In this work we present the X-ray properties of AGN at z > 5.5, when the Universe was less than 1 Gyr. We have cross-correlated 149 sources, from the three most recent lists of high-redshift QSOs (Bañados 2015, Mortlock 2015 and Matsuoka et al. 2016), with X-ray data from Chandra and XMM archives, to place constraints on their high-energy emission, column density and luminosity. We obtained a sample of 28 sources with X-ray coverage spread over the redshift range 5.5 < z < 7.1, with a fraction of 50% of detections, which allowed us to constrain the mean photon index for th e population of AGN at z = 6 for the first time. This represents the most complete and uniform study of the X-ray properties of AGN at high redshift (z>5.5) ever performed, with all the X-ray data currently available.
Samuele	Campitiello	Accretion disk emission around Kerr Black holes	Measuring the spin of supermassive Black holes in Active Galactic Nuclei is a further step towards a better understanding of the evolution of their physics. We proposed a new method to estimate the Black hole spin, based on data-fitting. We consider a numerical model called KERRBB, including all relativistic effects (i.e. light-bending, gravitational redshift and Doppler beaming). We found that the same spectrum can be produced by different masses, accretion rates and spins, but that these three quantities are related. In other words, having a robust indipendent estimate on one of these three quantities fixes the other two. By using the Black hole mass, estimated by the virial method, we can pinpoint a narrow range of possible spins and accretion rates for the 32 blazars we have studied. For these objects, we found a lower limit of the spin, that must be a/M > 0.6-0.7 .
Gabriella	Di Gennaro	Radio emission from the Brightest Central Galaxies in the Shapley Concentration Core	Extended cluster radio galaxies show different morphologies compared to those found isolated in the field. Indeed, symmetric double radio galaxies are only a small percentage of the total content of radio loud cluster galaxies, which show mainly tailed morphologies. Moreover, cluster mergers can deeply affect the statistical properties of their radio activity. In order to better understand the morphological and radio activity differences of the brightest central galaxies (BCGs) in major merging and non/tidal-merging clusters, we performed a multifrequency study of extended radio galaxies inside two cluster complexes, A3528 and A3558, belonging to the Shapley Concentration Core.
Simona	Paiano	GTC optical spectroscopy of Unassociated Gamma-ray Sources	About 30% of the gamma-ray sources detected by the Fermi satellite have not optical counterparts. Since the blazar class constitutes the major component of the gamma-ray emitters detected, we expect that a large fraction of the Unassociated Gamma-ray Sources (UGS) are also blazars. To investigate the nature of the population of UGSs we secured high quality optical (3800-10000 Ang) spectra of selected counterparts of UGS using OSIRIS spectrograph at the 10.4m telescope Gran Telescopio of Canarias (GTC) at La Palma. The counterparts of the Fermi gamma-ray emitters were selected according to the X-ray position (from Swift/XRT data) and multiwavelength SED in order to identify high confidence blazar candidates. We present here preliminary results for 15 sources for which we are able to confirm the blazar nature for most of the observed targets and derive their redshift or set lower limits.

Demetra	De Cicco	Variability-selected AGNs in the 3 yr Survey of the COSMOS Field by the VST	The present work is aimed at detecting AGNs in the COSMOS field on the basis of their optical variability, using data from the SUDARE survey by the VLT Survey Telescope (VST). The effectiveness of the method against other traditional photometric approaches was already explored in De Cicco+ 2015. Here we take advantage of the long (> 3yr) observing baseline to achieve great improvement in the completeness of our sample and to make use of the structure function of our confirmed AGNs to characterize the sample.
Valentina	Missaglia	Extending the Chandra 3C Snapshot Survey up to z = 1	The 3CR catalogue is one of the best studied sample of radio-loud active galaxies, spanning a wide range of redshifts and radio powers and being unbiased with respect to X-ray observations. We are completing the Chandra Snapshot Survey of the 3CR catalog. Preliminary results on the extension of the X-ray observations in the 0.5-1 redshift range are presented here. We compared Chandra observations with radio maps to search for extended emission associated with jets, hotspots and galaxy clusters. We found the X-ray radiation arising from the intergalactic medium in one galaxy cluster and we detected three hostpots in the Chandra images. X-ray emission from the core of all radio galaxies in our sample was also found, seven of them also showing extended X-ray emission around their nuclei.
Ilaria	Ruffa	IRAS 00183-7111: ALMA and X-ray view of an Ultra Luminous Infrared Galaxy	I will present a study of the multi-frequency properties of the Ultra Luminous Infrared Galaxy (ULIRG) IRAS 00183-7111 at z = 0.327, connecting ALMA sub-mm/mm observations with those at high energies, with the primary purpose to verify at what level the gas (traced by the CO) is responsible for the obscuration observed in X-rays (Ruffa et al. in prep.). Most of ULIRGs are known to host a heavily obscured AGN in its nuclear regions, and this fraction increases at increasing infrared luminosity. The detection of the most heavily obscured sources is crucial to shed light on the obscured accretion phase in black hole growth, the AGN/host galaxy co-evolution issue, and eventually estimate their contribution to the X-ray cosmic background. To link the sub-mm/mm to the X-ray properties of I00183, ALMA archival Cycle 0 data in Band 3 (87 GHz) and Band 6 (270 GHz) have been calibrated and analyzed, with the main goal to provide an improvement with respect to the available archival products and results. The high-energy data consists of Chandra, XMM-Newton and NuSTAR observations which allow a broad coverage of the spectrum in the energy range 0.5 − 30 keV. Chandra and XMM archival data were used, with an exposure time of 22 and 22.2 ks, respectively. The 100 ks NuSTAR are still private and the spectra were obtained by courtesy of the PI (K. Iwasawa). The main results show how the molecular gas in the central regions of I00183 can be considered responsible for a significant fraction of the AGN obscuration; further results, such a hint of an offset between the line and the continuum emission in ALMA Band 3 data, suggest interesting future perspectives for this work.