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Jobs Adverts - Meetings Adverts - Special Announcements

From the Editor

The Active Galaxies Newsletter is produced monthly. The deadline for contributions is the last friday of the month. The Latex macros for submitting abstracts and dissertation abstracts are appended to each issue of the newsletter and are also available on the web page.

As always as editor of the newsletter I am very interested to hear any suggestions or feedback regarding the newsletter. So do not hesitate in emailing me your suggestions.

Many thanks for your continued subscription.

Janine van Eymeren

Abstracts of recently accepted papers

Extended radio emission in MOJAVE Blazars: Challenges to Unification

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We present the results of a study on the kiloparsec-scale radio emission in the complete flux density limited MOJAVE sample, comprising 135 radio-loud AGNs. New 1.4 GHz VLA radio images of six quasars, and previously unpublished images of 21 blazars, are presented, along with an analysis of the high resolution (VLA A-array) 1.4 GHz emission for the entire sample. While extended emission is detected in the majority of the sources, about 7% of the sources exhibit only radio core emission. We expect more sensitive radio observations, however, to detect faint emission in these sources, as we have detected in the erstwhile "core-only" source, 1548+056. The kiloparsec-scale radio morphology varies widely across the sample. Many BL Lacs exhibit extended radio power and kiloparsec-scale morphology typical of powerful FRII jets, while a substantial number of quasars possess radio powers intermediate between FRIs and FRIIs. This poses challenges to the simple radio-loud unified scheme, which links BL Lacs to FRIs and quasars to FRIIs. We find a significant correlation between extended radio emission and parsec-scale jet speeds: the more radio powerful sources possess faster jets. This indicates that the 1.4 GHz (or low frequency) radio emission is indeed related to jet kinetic power. Various properties such as extended radio power and apparent parsec-scale jet speeds vary smoothly between different blazar subclasses, suggesting that, at least in terms of radio jet properties, the distinction between quasars and BL Lac objects, at an emission-line equivalent width of $5\AA$ is essentially an arbitrary one. While the two blazar subclasses display a smooth continuation in properties, they often reveal differences in the correlation test results, when considered separately. This can be understood if, unlike quasars, BL Lacs do not constitute a homogeneous population, but rather include both FRI and FRII radio galaxies for their parent population. It could also just be due to small number statistics. We find that the ratio of the radio core luminosity to the k-corrected optical luminosity (R_v) appears to be a better indicator of orientation for this blazar sample, than the traditionally used radio core prominence parameter (R_c). Based on the assumption that the extended radio luminosity is affected by the kiloparsec-scale environment, we define the ratio of extended radio power to absolute optical magnitude (L_{ext}/M_{abs}) as a proxy for environmental effects. Trends with this parameter suggest that the parsec-scale jet speeds and the parsec-to-kiloparsec jet misalignments are not affected by the large-scale environment,

but are more likely to depend upon factors intrinsic to the AGN, or its local parsec-scale environment. The jet speeds could, for instance, be related to the black hole spins, while jet misalignments could arise due to the presence of binary black holes, or kicks imparted to black holes via black hole mergers, consistent both with radio morphologies resembling precessing jet models observed in some MOJAVE blazars, and the signature of a 90 degree bump in the jet misalignment distribution, attributed to low-pitch helical parsec-scale jets in the literature. We suggest that some of the extremely misaligned MOJAVE blazar jets could be "hybrid" morphology sources, with an FRI jet on one side and an FRII jet on the other. Finally, it is tempting to speculate that environmental radio boosting (as proposed for Cygnus A) could be responsible for blurring the Fanaroff-Riley dividing line in the MOJAVE blazars, provided a substantial fraction of them reside in dense (cluster) environments.

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Near-IR dust and line emission from the central region of Mrk 1066: Constraints from Gemini NIFS

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We present integral field spectroscopy of the inner $700 \times 700\,\mathrm{pc}^2$ of the Seyfert galaxy Mrk 1066 obtained with Gemini's Near-Infrared Integral Field Spectrograph (NIFS) at a spatial resolution of $\approx$35 pc. This high spatial resolution allowed us to observe, for the first time in this galaxy, an unresolved dust concentration with mass $\sim 1.4 \times 10^{-2}\,\mathrm{M}_\odot$. This unresolved concentration, with emission well reproduced by a blackbody with temperature $\sim$830 K, is possibly part of the nuclear dusty torus. We compared maps of emission-line flux distributions and ratios with a 3.6 cm radio-continuum image and [O III] image in order to investigate the origin of the near-infrared emission. The emission-line fluxes are elongated in PA$= 135/315^\circ$ in agreement with the [O III] and radio images and, except for the H lines, are brighter to the north-west than to the south-east. This close association with the radio hot spot implies that at least part of the emitting gas is co-spatial with the radio outflow. The H emission is stronger to the south-east, where we find a large region of star-formation. The strong correlation between the radio emission and the highest emission-line fluxes indicates that the radio jet plays a fundamental role at these intensity levels. At lower emission-line fluxes this correlation disappears suggesting a contribution from the plane of the galaxy to the observed emission. The H_2 flux is more uniformly distributed and has an excitation temperature of ≈ 2100 K. Its origin appears to be circum-nuclear gas heated by X-rays from the central active nucleus. The [Fe II] emission also is consistent with X-ray heating, but its spatial correlation with the radio jet and [O III] emission indicates additional emission due to excitation and/or abundance changes caused by shocks in the radio jet. The coronal-line emission of [Ca VIII] and [S IX] are unresolved by our observations indicating a distribution within 18 pc from the nucleus. The reddening map obtained via the Paβ/Brγ line ratio ranges from $E(B-V) \approx 0$ to $E(B-V) \approx 1.7$ with the highest values defining a S-shaped structure along PA$\approx$135/315°. The emission-line ratios are Seyfert-like within the ionization cone indicating that the line emission is powered by the central active nucleus in these locations. Low ionization regions are observed away from the ionization cone, and may be powered by the diffuse radiation field which filters through the ionization cone walls. Two regions at 0.5 arcsec south-east and at $1''$ north-west of the nucleus show starburst-like line ratios, co-spatial with an enhancement in the emission of the H lines. We attribute this change to additional emission from star forming regions. The mass of ionized gas is $M_{HII} \approx 1.7 \times 10^7\,\mathrm{M}_\odot$ and that of hot molecular gas is $M_{H_2} \approx 3.3 \times 10^3\,\mathrm{M}_\odot$.

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J004457+4123 (Sharov 21): not a remarkable nova in M31 but a background quasar with a spectacular UV flare

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We announce the discovery of a quasar behind the disk of M31, which was previously classified as a remarkable nova in our neighbour galaxy. The paper is primarily aimed at the outburst of J004457+4123 (Sharov 21), with the first part focussed on the optical spectroscopy and the improvement in the photometric database. Both the optical spectrum and the broad band spectral energy distribution of Sharov 21 are shown to be very similar to that of normal, radio-quiet type 1 quasars. We present photometric data covering more than a century and resulting in a long-term light curve that is densely sampled over the past five decades. The variability of the quasar is characterized by a ground state with typical fluctuation amplitudes of ~ 0.2 mag around $B \sim 20.5$, superimposed by a singular flare of ~ 2 yr duration (observer frame) with the maximum at 1992.81 where the UV flux has increased by a factor of ~ 20. The total energy in the flare is at least three orders of magnitudes higher than the radiated energy of the most luminous supernovae, provided that it comes from an intrinsic process and the energy is radiated isotropically. The profile of the flare light curve appears to be in agreement with the standard predictions for a stellar tidal disruption event where a $\sim 10\,M_\odot$ giant star was shredded in the tidal field of a $\sim 2\ldots5\;10^8\,M_\odot$ black hole. The short fallback time derived from the light curve requires an ultra-close encounter where the pericentre of the stellar orbit is deep within the tidal disruption radius. Gravitational microlensing provides an alternative explanation, though the probability of such a high amplification event is very low.

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Galaxy Zoo: The fundamentally different co-evolution of supermassive black holes and their early- and late-type host galaxies[1]

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We use data from the Sloan Digital Sky Survey and visual classifications of morphology from the Galaxy Zoo project to study black hole growth in the nearby Universe ($z < 0.05$) and to break down the AGN host galaxy population by color, stellar mass and morphology. We find that black hole growth at luminosities $L[\mathrm{O\,III}] > 10^{40}$ ergs^{-1} in early- and late-type galaxies is fundamentally different. AGN host galaxies as a population have a broad range of stellar masses ($10^{10} - 10^{11} M_{\odot}$), reside in the green valley of the color-mass diagram and their central black holes have median masses around $10^{6.5} M_{\odot}$. However, by comparing early- and late-type AGN host galaxies to their non-active counterparts, we find several key differences: in early-type galaxies, it is preferentially the galaxies with the *least massive* black holes that are growing, while late-type galaxies, it is preferentially the *most massive* black holes that are growing. The duty cyc! le of AGN in early-type galaxies is strongly peaked in the green valley below the low-mass end ($10^{10} M_{\odot}$) of the red sequence at stellar masses where there is a steady supply of blue cloud progenitors. The duty cycle of AGN in late-type galaxies on the other hand peaks in massive ($10^{11} M_{\odot}$) green and red late-types which generally do not have a corresponding blue cloud population of similar mass. At high Eddington ratios ($L/L_{\mathrm{Edd}} > 0.1$), the only population with a substantial fraction of AGN are the low-mass green valley early-type galaxies. Finally, the Milky Way likely resides in the "sweet spot" on the color-mass diagram where the AGN duty cycle of late-type galaxies is highest. We discuss the implications of these results for our understanding of the role of AGN in the evolution of galaxies.

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Centaurus A at Hard X-rays and Soft Gamma-rays

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Centaurus A, at a distance of less than 4 Mpc, is the nearest radio-loud AGN. Its emission is detected from radio to very-high energy gamma-rays. Despite the fact that Cen A is one of the best studied extragalactic objects the origin of its hard X-ray and soft gamma-ray emission ($100\ keV < E < 50\ MeV$) is still uncertain. Observations with high spatial resolution in the adjacent soft X-ray and hard gamma-ray regimes suggest that several distinct components such as a Seyfert-like nucleus, relativistic jets, and even luminous X-ray binaries within Cen A may contribute to the total emission in the MeV regime that has been detected with low spatial resolution. As the Spectral Energy Distribution of Cen A has its second maximum around 1 MeV, this energy range plays an important role in modeling the emission of (this) AGN. As there will be no satellite mission in the near future that will cover this energies with higher spatial resolution and better sensitivity, an overview of all existing hard X-ray and soft gamma-ray measurements of Cen A is presented here defining the present knowledge on Centaurus A in the MeV energy range.

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Twelve years of X-ray and optical variability in the Seyfert galaxy NGC 4051

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We discuss the origin of the optical variations in the Narrow line Seyfert 1 galaxy NGC 4051 and present the results of a cross-correlation study using X-ray and optical light curves spanning more than 12 years. The emission is highly variable in all wavebands, and the amplitude of the optical variations is found to be smaller than that of the X-rays, even after correcting for the contaminating host galaxy flux falling inside the photometric aperture. The optical power spectrum is best described by an unbroken power law model with slope $\alpha = 1.4^{+0.6}_{-0.2}$ and displays lower variability power than the 2-10 keV X-rays on all time-scales probed. We find the light curves to be significantly correlated at an optical delay of $1.2^{+1.0}_{-0.3}$ days behind the X-rays. This time-scale is consistent with the light travel time to the optical emitting region of the accretion disc, suggesting that the optical variations are driven by X-ray reprocessing. We show, however, that a model whereby the optical variations arise from reprocessing by a flat accretion disc cannot account for all the optical variability. There is also a second significant peak in the cross-correlation function, at an optical delay of $39^{+2.7}_{-8.4}$ days. The lag is consistent with the dust sublimation radius in this source, suggesting that there is a measurable amount of optical flux coming from the dust torus. We discuss the origin of the additional optical flux in terms of reprocessing of X-rays and reflection of optical light by the dust.

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AGN population in Hickson's Compact Groups. I. Data and Nuclear Activity Classification

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We have conducted a new spectroscopic survey to characterize the nature of nuclear activity in Hickson Compact Groups (HCGs) galaxies and establish its frequency. We have obtained new intermediate resolution optical spectroscopy for 200 member-galaxies and corrected for underlying stellar population contamination using galaxy templates. Spectra for 11 additional galaxies have been acquired from the ESO and 6dF public archives and emission line ratios have been taken from the literature for 59 galaxies more. Here we present the results of our classification of the nuclear activity for 270 member-galaxies, which belong to a well defined sample of 64 HCGs. We found a large fraction of galaxies, 63%, with emission lines. Using standard diagnostic diagrams, 45% of the emission line galaxies were classified as pure AGNs, 23% as Transition Objects (TOs) and 32% as Star Forming Nuclei (SFNs). In the HCGs, the AGN activity appears as the most frequent activity type. Adopting the interpretation that in TOs a Low Luminosity AGN coexists with circumnuclear star formation, the fraction of galaxies with an AGN could rise to 42% of the whole sample. The low frequency (20%) of SFNs confirms that there is no star formation enhancement in HCGs.

After extinction correction we found a median AGN Hα luminosity of 7.1×10^{39} erg s^{-1}, which implies that AGNs in HCG have a characteristically low luminosity. This result added to the fact, that there is an almost complete absence of Broad Line AGNs in Compact Groups (CGs) as found by Martínez et al.(2008a) and corroborated in this study for HCGs, is consistent with very few gas left in these galaxies. In general, therefore, what may characterize the level of activity in CGs is a severe deficiency of gas.

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Modelling the orientation of accretion discs in quasars using H α emission

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Infrared spectroscopy of the H α emission lines of a sub-sample of 19 high-redshift ($0.8 < z < 2.3$) Molonglo quasars, selected at 408 MHz, is presented. These emission lines are fitted with composite models of broad and narrow emission, which include combinations of classical broad-line regions (BLRs) of fast-moving gas clouds lying outside the quasar nucleus, and/or a theoretical model of emission from an optically-thick, flattened, rotating accretion disc, with velocity shifts allowed between the components. All bar one of the 19 sources are found to have emission consistent with the presence of an optically-emitting accretion disc, with the exception appearing to display complex emission including at least three broad components. 10 of the quasars have strong Bayesian evidence for broad-line emission arising from an accretion disc together with a standard BLR, selected in preference to a model with two simple broad lines. Thus, the best explanation for the complexity required to fit the broad H α lines in this sample is optical emission from an accretion disc in addition a region of fast-moving clouds. We derive estimates of the angle between the rotation axis of the accretion disc and the line of sight. Deprojecting radio sources on the assumption of jets emerging perpendicular to the accretion disc gives rough agreement with expectations of radio source models. The distribution in disc angles is broadly consistent with models in which a Doppler boosted core contributes to the chances of observing a source at low inclination to the line of sight, and in which the radio jets expand at constant speed up to a size of ~ 1 Mpc. A weak correlation is found between the accretion disc angle and the logarithm of the low-frequency radio luminosity. This is direct, albeit tenuous, evidence for the receding torus model in which the opening angle of the torus widens with increasing radio luminosity. The highest accretion disc angle measured is 48°, consistent with the opening angle predicted for radio-luminous sources. Velocity shifts of the broad H α components are analysed and the results found to be consistent with a two-component model comprising one single-peaked broad line emitted at the same redshift as the narrow lines, and emission from an accretion disc which appears to be preferentially redshifted with respect to the narrow lines for high-redshift sources and blueshifted relative to the narrow lines for low-redshift sources. An additional analysis is performed in which the disc emission is fixed at the redshift of the narrow-line region; although only two quasars show a robust change in fitted angle, the radio luminosity – disc angle correlation falls sharply in probability, and so is strongly model dependent in this sample.

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The Simultaneous Optical-to-X-ray Spectral Energy Distribution of Soft X-ray Selected AGN observed by *Swift*

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We report *Swift* observations of a sample of 92 bright soft X-ray selected active galactic nuclei (AGN). This sample represents the largest number of AGN observed to study the spectral energy distribution (SED) of AGN with simultaneous optical/UV and X-ray data. The principal motivation of this study is to understand the SEDs of AGN in the optical/UV to X-ray regime and to provide bolometric corrections which are important in determining the Eddington ratio $L/L_{\rm Edd}$. In particular, we rigorously explore the dependence of the UV-EUV contribution to the bolometric correction on the assumed EUV spectral shape. We find strong correlations of the spectral slopes $\alpha_{\rm X}$ and $\alpha_{\rm UV}$ with $L/L_{\rm Edd}$. Although Narrow-Line Seyfert 1 galaxies (NLS1s) have steeper $\alpha_{\rm X}$ and higher $L/L_{\rm Edd}$ than Broad-Line Seyfert 1 galaxies (BLS1s), their optical/UV to X-ray spectral slopes $\alpha_{\rm ox}$ and optical/UV slopes $\alpha_{\rm UV}$ are very similar. The mean SED of NLS1s shows that in general this type of AGN appears to be fainter in the UV and at hard X-ray energies than BLS1s. We find a strong correlation between $\alpha_{\rm X}$ and $\alpha_{\rm UV}$ for AGN with X-ray spectral slopes $\alpha_{\rm X}<1.6$. For AGN with steeper X-ray spectra, both this relation and the relation between $\alpha_{\rm X}$ and $L/L_{\rm Edd}$ break down. At $\alpha_{\rm X}\approx 1.6$, $L/L_{\rm Edd}$ reaches unity. We note an offset in the $\alpha_{\rm UV}$- $L/L_{\rm Edd}$ relation between NLS1s and BLS1s. We argue that $\alpha_{\rm UV}$ is a good estimator of $L/L_{\rm Edd}$ and suggest that $\alpha_{\rm UV}$ can be used to estimate $L/L_{\rm Edd}$ in high-redshift QSOs. Although NLS1s appear to be highly variable in X-rays they only vary marginally in the UV.

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Long-Term Optical Continuum Color Variability of Nearby Active Galactic Nuclei

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We examine whether the spectral energy distribution of optical continuum emission of active galactic nuclei (AGNs) changes during flux variation, based on accurate and frequent monitoring observations of 11 nearby Seyfert galaxies and QSOs carried out in the B, V, and I bands for seven years by the MAGNUM telescope. The multi-epoch flux data in any two different bands obtained on the same night show a very tight linear flux to flux relationship for all target AGNs. The flux of the host galaxy within the photometric aperture is carefully estimated by surface brightness fitting to available high-resolution HST images and MAGNUM images. The flux of narrow emission lines in the photometric bands is also estimated from available spectroscopic data. We find that the non-variable component of the host galaxy plus narrow emission lines for all target AGNs is located on the fainter extension of the linear regression line of multi-epoch flux data in the flux to flux diagram. This result strongly indicates that the spectral shape of AGN continuum emission in the optical region ($\sim$ 4400–7900$\AA$) does not systematically change during flux variation. The trend of spectral hardening that optical continuum emission becomes bluer as it becomes brighter, which has been reported by many studies, is therefore interpreted as the domination of the variable component of the nearly constant spectral shape of an AGN as it brightens over the non-variable component of the host galaxy plus narrow lines, which is usually redder than AGN continuum emission.

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Optically Selected BL Lacertae Candidates from the Sloan Digital Sky Survey Data Release Seven

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We present a sample of 723 optically selected BL Lac candidates from the SDSS DR7 spectroscopic database encompassing

8250 deg^2 of sky; our sample constitutes one of the largest uniform BL Lac samples yet derived. Each BL Lac candidate has a high-quality SDSS spectrum from which we determine spectroscopic redshifts for $\sim$60% of the objects. Redshift lower limits are estimated for the remaining objects utilizing the lack of host galaxy flux contamination in their optical spectra; we find that objects lacking spectroscopic redshifts are likely at systematically higher redshifts. Approximately 80% of our BL Lac candidates match to a radio source in FIRST/NVSS, and $\sim$40% match to a ROSAT X-ray source. The homogeneous multiwavelength coverage allows subdivision of the sample into 637 radio-loud BL Lac candidates and 86 weak-featured radio-quiet objects. The radio-loud objects broadly support the standard paradigm unifying BL Lac objects with beamed radio galaxies. We propose that the majority of the radio-quiet objects may be lower-redshift ($z < 2.2$) analogs to high-redshift weak line quasars (i.e., AGN with unusually anemic broad emission line regions). These would constitute the largest sample of such objects, being of similar size and complementary in redshift to the samples of high-redshift weak line quasars previously discovered by the SDSS. However, some fraction of the weak-featured radio-quiet objects may instead populate a rare and extreme radio-weak tail of the much larger radio-loud BL Lac population. Serendipitous discoveries of unusual white dwarfs, high-redshift weak line quasars, and broad absorption line quasars with extreme continuum dropoffs blueward of rest-frame 2800 Å are also briefly described.

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Thesis Abstracts

The orientation of accretion disks and jets in quasars

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Ph.D degree awarded: September 2008

All massive nearby galaxies, including our own, host supermassive black holes. Active galactic nuclei (AGN) are seen when such black holes accrete, and when they produce powerful jets of synchrotron-emitting plasma, they are termed radio-loud AGN. The close correlation between black hole mass and galaxy bulge mass in elliptical galaxies indicates that AGN feedback may be the key to the regulation of galaxy formation. It is thus necessary to fully understand the structure of AGN, the way that they are fuelled, and their duty cycle, in order to study the feedback processes and get a clear picture of galaxy formation.

In this thesis, independent methods are developed to constrain the accretion disk and radio jet angles to the line of sight. $H\,\alpha$ emission from a sub-sample of high-redshift quasars is measured from near-infrared spectroscopy and modelled as sums of different components, including the characteristic double-peaked profile which results from a thin, rotating accretion disk. Comparing the models using Bayesian evidence, almost all quasars were found to have infrared spectra consistent with the presence of a disk. The jet inclination angles of the same set of quasars were constrained by fitting a model, including the effect of Doppler boosting and the receding torus model for dust obscuration, to the radio spectral energy distribution.

The fitted disk and jet angles correlate strongly, and are consistent with a model in which the radio jets are launched orthogonally to the plane of the accretion disk, as expected if the jet is powered by energy drawn from the spin of the black hole. Both disk and jet angles correlate with the observed linear source size, which is a projection effect; when deprojected using the fitted angles, the distribution of source sizes agrees with a scenario in which the sources expand into the surrounding medium at a constant rate up to ~ 1 Mpc and then shut off, probably as the nuclei become quiescent. The accretion disk angle was found to correlate weakly with the low-frequency radio luminosity, which provides direct, albeit tenuous, evidence for the receding torus model.

Meetings

Cosmic Feedback, event E17 at the 38th Cospar Scientific Assembly

Bremen, Germany
July 18-25 2010

Webpage: `http://www.cospar-assembly.org/admin/congress_overview.php?sessionid=172`
Email: `cospar.e17.2010@gmail.com`

We are pleased to announce the "Cosmic Feedback" session at the 38th Cospar Scientific Assembly, to be held in Bremen, Germany, on July 18-25 2010.

Feedback processes are being recognized more and more as fundamental for our understanding of the evolving Universe. They are important on all scales from the interstellar medium, galaxy halos and evolution, starbursts, AGN outflows, cooling cluster cores to the warm-hot intergalactic medium. The launch of the UV spectroscopy mission COS in 2008, synergy, simultaneous observations and continued operation of X-ray observatories such as XMM-Newton, Chandra and Suzaku will deepen our understanding of these processes. Increasingly more powerful and physically more complete numerical models allow a unique confrontation between observations and theory.

The event foresees solicited and contributed talks, as well as posters, highlighting the feedback processes in different astrophysical environments from both the theoretical and observational perspective.

We invite participants to submit an abstract for an oral or poster presentation at the Cospar general web site:
www.cospar-assembly.org selecting the "Cosmic feedback" event (E17).

The dead line for abstract submission is ** Feb 19 2010 **

The event description and the list of confirmed solicited speakers so far can be found at
http://www.cospar-assembly.org/admin/congress_overview.php?sessionid=172

We hope to see you at the Cospar Scientific Assembly,

on behalf of the SOC,

Elisa Costantini
Main Scientific Organizer

Gerard Kriss
Deputy Organizer

460th WE-Heraeus Seminar: Black Holes

Bad Honnef, Germany
June 6-11, 2010

Webpage: `http://www.xray.mpe.mpg.de/ skomossa/Heraeus460/index.html`
Email: `skomossa@mpe.mpg.de`

The last decade has witnessed rapid progress in the astrophysical study of black holes. Observations have shown that many nearby galaxies host supermassive black holes at their centers, and have established an intimate link between the masses of the black holes and the properties of their host galaxies. Measurements in the high-energy X-ray regime have allowed us to study the conditions of matter in the immediate vicinity of black holes, and to probe down to scales very close to the actual event horizon of black holes. Breakthroughs in numerical relativity have made it possible, for the first time, to compute the merging of two supermassive black holes. Within the next ten years, ground-based gravitational wave detectors like LIGO and VIRGO will begin making regular observations of merging stellar-mass black holes out to redshifts of $\sim$0.3. Future space-based observatories like IXO will measure X-rays from the first accreting massive black holes in the Universe, while LISA will detect gravitational waves from coalescing supermassive black hole binaries throughout the Universe. Gravitational wave and electromagnetic astronomy have previously been rather disjoint fields of research. A key goal of this seminar is to bring together researchers in these two fields, and to provide a forum for lively discussions, with an emphasis on the electromagnetic and gravitational wave signatures of strong gravity.

The seminar will focus on the following key topics: (1) Astrophysical observations and physics of black holes, and probes of strong gravity.
(2) Formation and growth of supermassive black holes across cosmic times, co-evolution of galaxies and black holes.
(3) Galaxy mergers, formation and coalescence of binary supermassive black holes.
(4) Gravitational wave emission from compact objects.
(5) Current and future ground- and space-based missions which are devoted to the study of gravitational waves and electromagnetic radiation from (the environment of) black holes.
(6) Electromagnetic signatures of black hole binaries and recoiling black holes.

The seminar will consist of invited review talks (35+5min), contributed talks (15+5 min), and posters. The number of participants is limited to 70. Selection will be made on a "first come, first serve basis. There is no conference fee. Deadline for registration is March 10, 2010.

10th EVN Symposium 2010: VLBI and the new generation of radio arrays

Manchester, UK
September 20th-24th, 2010

Webpage: `http://www.jodrellbank.manchester.ac.uk/meetings/evn2010`
Email: `evnsymp2010@jb.man.ac.uk`

SCIENTIFIC RATIONALE: Jodrell Bank Centre for Astrophysics and the University of Manchester, on behalf of the European VLBI Consortium, will host the 10th European VLBI Network Symposium from September 20th to 24th, 2010. The Symposium will be held at the University of Manchester, UK.

At this conference the latest scientific results and technical developments from VLBI and e-VLBI results will be reported. The timing of this meeting coincides with the development of, and first results from a number of new and upgraded radio facilities around the globe, such as e-MERLIN, LOFAR, EVLA, ALMA, and the SKA pathfinders ASKAP and MeerKAT. This meeting will incorporate some of the firs results from these new instruments, in addition to the unique scientific and technical contribution of VLBI in this new era of radio astronomy.

PLANNED SCIENCE SESSIONS will include: Life cycle of matter in stars and galaxies; AGN and cosmic star-formation; Extreme Astrophysics; Astrometry, Geodesy, space and planetary science; and Techniques & developments.

VENUE: The conference will be held in the University of Manchester's conference venue, the Weston Building, which is situated in city centre of Manchester. Manchester itself is a vibrant city with ample attractions and amenities for all visitors. Block bookings of rooms for the duration of the meeting at the conference venue itself. Further information regarding this conference as well as specific details regarding the venue and accommodation will available shortly on the conference website and in subsequent announcements. This meeting will also incorporate the EVN Users meeting and a trip to Jodrell Bank Observatory.