SESSION I: **JET OBSERVATIONS**

Microquasars, AGN and Gamma-Ray Bursts Jets: Topical Questions
Felix Mirabel

I will review open questions on relativistic jets.

Steady Jet and Transient Jets Radio/X-ray Characteristics
Maria Massi

Two types of radio emission are observed from X-ray binaries with jets. They have completely different characteristics and are associated with different kinds of ejections. One corresponds to a flat or inverted spectrum and the other to an optically thin spectrum. The flat or inverted spectrum covers the whole radio band and has been established also at millimeter and infrared wavelengths. When this kind of radio emission is spatially resolved it appears as a continuous jet, the so-called ``steady jet''. In contrast, the optically thin spectra are associated with isolated components, so-called ``knots'' or ``plasmoids'', which are moving at relativistic speed away from the binary. This kind of ejecta are also known as a ``transient jet''. The most important point is that the two kinds of radio emission and their corresponding types of ejection are related to each other; if the optically thin spectrum (the transient jet) appears, then it always happens after the flat/inverted one (the steady jet). The transient jet is explained by the shock-in-jet model: the optically thin spectrum is due to shocks caused by relativistic plasma traveling through a pre-existing much slower steady flow (``steady jet''). This steady flow is responsible for the preceding optically thick spectrum. Steady jets and transient jets are produced when the X-ray binary is in one of the two different X-rays states: low/hard and steep power-law state. The low/hard X-ray state is the state characterized by a power-law with photon index 1.5< \Gamma < 2.1 and a clear steep cut-off near 100 keV. In the steep power law X-ray state, where an unbroken steep power-law is a fundamental property of the state, the photon index in the X-ray and gamma-ray bands is the same: \Gamma \sim 2.5-3.0.

Quasi-stationary and Transitory Patterns in Jets
Andrei Lobanov

Apparent evolution of relativistic flows as traced by radio emission results from a combination of several factors related to propagation of relativistic blobs or shocks, velocity, density and pressure stratification of the underlying flow, plasma instability and (possibly also) phase and time travel effect. This combination can create an intricate and chaotic patterns of the observed morphological changes in radio emission, which complicates the analysis and interpretation of kinematic and physical properties of the jet plasma. Recent studies have indicated that slow and quasi-stationary patterns in jets are most likely formed by plasma instabilities while faster, superluminally moving patterns are related to highly relativistic plasma condensations produced by the nuclear flares. Some of the stationary patterns may also be related to recollimation shocks or locations where strong non-thermal continuum is produced in jets. Similarities and differences of the AGN and XRB jets in this respect will be reviewed.

Radio and X-rays from GRS1915+105 - Close Correlations of the Third Kind
Ralph Spencer and Tony Rushton

We have examined a decade's worth of radio data from the Ryle telescopes and MERLIN on the microquasar GRS1915+105 and found 3 basic kinds of correlation - the well known low-hard state, the radio flaring state, and a new one - a long term variation combining both states. There is a close correlation during the low/hard state over periods a a few weeks, suggesting either an improbably close connection between accretion rate and radio emission, or that a large fraction of the X-ray emission is via the synchrotron process in the jets.

P1- Two-component jets and the Fanaroff-Riley dichotomy
Zakaria Meliani

Transversely stratified jets are observed in many classes of astrophysical object, ranging from young stellar objects, micro-quasar to active galactic nuclei and even in Gamma Ray Bursts. Theoretical arguments support this transverse stratification of jets with two components induced by intrinsic features of the central engine (accretion disk + black hole). In fact, according to the observations and theoretical models, a typical jet has an inner fast low density jet, surrounded by a slower, denser, extended jet. We elaborate on this model and investigate for the first time this two-component jet evolution with very high resolution in 3D. We demonstrate that two-component jets with high kinetic energy flux contribution from the inner jet are subject to the development of a relativistically enhanced, rotation-induced Rayleigh-Taylor type non-axisymmetric instability. This instability induces strong mixing between both components, decelerating the inner jet and leading to overall jet decollimation. This novel scenario of sudden jet deceleration and decollimation can explain the radio source Fanaroff-Riley dichotomy as a consequence of the efficiency of the central engine in launching the inner jet component vs. the outer jet component. We infer that the FRII/FRI transition, interpreted in our two-component jet scenario, occurs when the relative kinetic energy flux of the inner to the outer jet exceeds a critical ratio.

P2- Radio properties of steep-spectrum and flat-spectrum Seyfert nuclei

Monica Orienti

Radio observations with different spatial resolution of Seyfert nuclei have shown that the radio emission arising from their parsec-scale structure is often much fainter than that derived from observations with lower resolution, even if the nucleus is unresolved. However, evidence of undetected flux density on parsec scales is not a feature common to all Seyfert nuclei, but it has been observed mainly in those with a steep spectrum. I present the results of multi-frequency radio observations of the nearest and brightest Seyfert nuclei in the Southern Hemisphere. In particular, I discuss the different radio properties of steep-spectrum and flat-spectrum Seyfert nuclei.

P3- Proper motion and apparent contraction in the compact symmetric object J0650+6001

Monica Orienti and Daniele Dallacasa

The evolutionary stage of a powerful radio source originated by an AGN is related to its linear size. In this context, compact symmetric objects (CSOs), which are powerful and intrinsically small radio sources, should represent a young stage in the individual radio source life. A decisive support to the genuine "youth" of this class of objects came from the determination of their hotspot separation rate, which provided kinematic ages of a few thousand years. Among the CSOs studied so far, the radio source J0650+6001 is the only object showing an apparent source contraction. No evidence of hotspot separation increase has been found. Here, we present the results of multi-epoch VLBI observations of J0650+6001 and we suggest that the peculiar characteristics shown by this source may be related to Doppler beaming of a mildly relativistic jet.

P4- Jet opening angles and gamma-ray brightness of AGN

Alexander Pushkarev

We have investigated the differences in apparent opening angles between the parsec-scale jets of the active galactic nuclei (AGN) monitored by the 2cm VLBA MOJAVE program and detected by the Fermi Large Area Telescope (LAT) during its first 11 months of operations and those of non-LAT-detected AGN. The apparent opening angles were determined by analyzing transverse jet profiles from the data in the image plane and by applying a model fitting technique to the data in the (u,v) plane. Both methods provided comparable opening angle estimates. The apparent opening angles of gamma-ray bright blazars are preferentially larger than those of gamma-ray weak sources. At the same time, we have found the two groups to have similar intrinsic opening angle distributions, based on a smaller subset of sources. This suggests that the jets in gamma-ray bright AGN are oriented at preferentially smaller angles to the line of sight resulting in a stronger relativistic beaming. The intrinsic jet opening angle and the bulk flow Lorentz factor are found to be inversely proportional, as predicted by standard models of compact relativistic jets.

P5- Beaming properties of gamma-ray bright blazars

Tuomas Savolainen

We investigate the dependence of gamma-ray brightness of blazars on intrinsic and beaming properties of their parsec-scale radio jets. By combining high-resolution VLBI images and millimeter-wavelength flux density monitoring data of 62 blazars, we have estimated their jet Doppler factors, Lorentz factors, and viewing angles in the observer's frame and in the frame comoving with the jet. The analysis shows that blazars detected by the Fermi Gamma-ray Space Telescope have preferentially higher Doppler factors than gamma-ray weak blazars, and that the gamma-rays are emitted into a rather narrow range of angles roughly perpendicular to the jet flow direction in its comoving frame. The lack of gamma-ray bright blazars at large comoving frame viewing angles can be explained by relativistic beaming of gamma-rays, while the apparent lack of gamma-ray bright blazars at small comoving frame viewing angles, if confirmed with larger samples, may suggest an intrinsic anisotropy or Lorentz factor dependence of the gamma-ray emission.

P6- Variability and stability in blazar jets on time-scales of years: optical polarization monitoring of OJ 287 in 2005 - 2009

Jochen Heidt

OJ 287 is a BL Lac object which has shown double-peaked bursts at regular intervals of ~12 yr during the last ~40 yr. We analyse optical photopolarimetric monitoring data from 2005 to 2009, during which the latest double-peaked outburst occurred. We find a strong preferred position angle in optical polarization, which can be explained by separating the jet emission into an optical polarization core and chaotic jet emission. The optical polarization core is stable on time-scales of years and can be explained as emission from an underlying quiescent jet component. The chaotic jet emission sometimes exhibits a circular movement in the Stokes plane. We find six such events, all on the time-scales of 10-20 d, which we interpret as a shock front moving forwards and backwards in the jet, swiping through a helical magnetic field. In addition, we use our own data and other properties of OJ 287 compiled from the literature (black hole mass, accretion flow properties) to assess the different binary black hole models proposed to explain its regularly appearing double-peaked bursts. None of the models is able to fully explain all observations. We suggest instead that both the double-peaked bursts and the evolution of the optical polarization position angle could be explained as a sign of resonant accretion of magnetic field lines, a 'magnetic breathing' of the disc.

P7- The Radio Flare in the Jet of CTA102

C. M. Fromm , E. Ros, T. Savolainen , A. P. Lobanov , M. Perucho and J. A. Zensus

The 2006 radio outburst in the blazar CTA 102 offers a unique laboratory to study physical properties of the jet under extreme conditions. From the analysis of single dish observations we can derive the evolution of the flare in turnover frequency- turnover flux density (νm -Sm) plane and compare it to the theoretical predictions of the shock-in-jet model (Marscher & Gear 1985). Taking into account the quiescent jet emission we found the three characteristic shock phases, Compton, synchrotron and adiabatic phases, with minor discrepancies from the model. The additional analysis of multi-frequency VLBI observations together with MOJAVE-derived kinematics leads to the picture of an over-pressured jet with respect to the ambient medium. The result of relativistic hydrodynamic simulations (e.g. shock-shock intersection) support our assumption of an over pressured jet.

P8- Interpretation of the development of flare phenomena 2004-2007 in the blazar 3C 454.3

A. Volvach and M.Larionov

Radio and optical data are used to analyze the development of the flare in the blazar 3C 454.3 observed in 2004-2007. A detailed correspondance between the optical and radio flares is established, with a time delay that depends on the observing frequency. Small-scale flux variations on time intervals of 5-10 days in the millimeter and optical are also correlated, with a time delay of about ten months. This may provide evidence for a single source generating the radiation at all wavelengths. The presence of a tight correlation between the features and shapes of flux-variation curves during the development of a flare in the optical and radio enables us to specify in somewhat more detail the physics of phenomena occurring in the accretion disk and jet outflows.

P9- The jet of the BL Lacertae object PKS 2201+044 in the near-IR: MAD adaptive optics observations.

Elisabetta Liuzzo

BL Lac objects are low power active nuclei exhibiting a variety of peculiar properties caused by presence of a relativistc jet and orientation effects. We present adaptive optics near-IR images at high spatial resolution of nearby BL Lac object PKS 2201+044. The observations were obtained in K band using the ESO multi-conjugated adaptive optics demonstrator at the Very Large Telescope. This allow us to obtain images with 0.1 arcsec effective resolution. We preformed a detailed analysis of the jet and its related features from the near-IR images, and combined them with images previously obtained with HST, VLA ,CHandra and Merlin. We present our results in the poster.

P10- V4641 Sgr and KV UMa. Two black hole candidates
Chuprikov Andrey

We analyze the results of processing of VLA and VLBA data of two objects, V4641 Sgr (J1819-2524), and KV UMa (X1118+4802), available in the NRAO archive. VLA and VLBA images of both objects for some frequency ranges for the epoch between 2000 and 2007 are presented. Values of physical parameters of V4641 Sgr and KV UMA and their changes in time are discussed.

P11- Radio spectral index analysis of the TeV gamma-ray source LS I +61303
M. Massi and M. Kaufman Bernado'

Recent observations with Cherenkov Telescopes have found four TeV emitting compact stellar binaries. Whereas one of the four gamma-ray binaries, PSR B1259-63, is a pulsar and another one, Cygnus X-1, is a microquasar, the open issue is whether the very high energy gamma-rays in the other two, LSI+61303 and LS 503 are powered by shocks at the boundary between the wind of the companion star and a possible pulsar wind or by relativistic jets of microquasars.These two alternative models, pulsar or microquasar, have been tested for LS I+61303 analyzing the radio spectral index over 6.7 years from Green Bank Interferometer data at 2.2 GHz and 8.3 Ghz. We find two new characteristics in the radio emission: The first characteristic is that the periodic outbursts towards apastron indeed consist of two consecutive outbursts; the first outburst is optically thick, whereas the second outburst is optically thin. The spectrum of LS I +61?303 is well reproduced by the shock-in-jet model commonly used in the context of microquasars and active galactic nuclei: the optically thin spectrum is due to shocks caused by relativistic plasma ("transient jet") traveling through a preexisting much slower steady flow ("steady jet"). This steady flow is responsible for the preceding optically thick spectrum. The second characteristic we find is that the observed spectral evolution, from optically thick to optically thin emission, occurs twice during the orbital period. We observed this occurrence towards apastron and also towards periastron. We show that this result qualitatively and quantitatively agrees with the two-peak accretion/ejection model proposed in the past for LS I +61303. We conclude that the radio emission in LS I +61303 originates from a jet and suggest that the variable TeV emission comes from the usual Compton losses expected as an important by-product in the shock-in-jet theory.

P12- The puzzling varying radio structure of LS I +61303
Lisa Zimmermann and M. Massi

Recent analysis of the radio spectral index and high energy observations have shown that the two-peak accretion/ejection microquasar model applies for LSI +61?303. Aim of this work is to explain therefore in the context of the microquasar scenario the fast (daily) variations of the position angle observed with MERLIN and confirmed by consecutive VLBA images, which were before attributed to the cometary tail of a pulsar. We calculate what could be the precessional period for the accretion disk under tidal forces of the Be star ($P_{\text{Tidal Forces}}$) or under the effect of frame dragging produced by rotation of the compact object ($P_{\text{Lense Thirring}}$). Our results are that $P_{\text{Tidal Forces}}$ is at least one year, while $P_{\text{Lense Thirring}}$ strongly depends on the truncated radius of the accretion disk (R_{tr}). We determine $R_{tr} = 300\ r_g$ for observed QPO at 2 Hz. This value is much above the few r_g, where the Bardeen-Petterson effect should align the midplane of the disk, and agrees well with the expectation of the truncated radius for the very low/hard state of LSI +61?303 (>100 r_g). For $R_{tr} = 300\ r_g$, $P_{\text{Lense Thirring}}$ results in a few days for a slow rotator. Therefore we conclude that Lense-Thirring precession induced by a slowly rotating compact object could explain the daily variations of the ejecta angle observed in LSI +61?303. The radio morphology of the TeV gamma-ray source LSI +61 303 undergoes very fast variations. Possible physical mechanisms for these variations are here examined.

P13- Superluminal Motion in AGNs and GRBs
Zhi-Bin Zhang

Active galactic nuclei (AGNs) and gamma-ray bursts (GRBs) have very different lifetime and characteristics. However, they are usually thought to be driven by the similar process of a relativistic jet. In this work, we have compared the common phenomena of apparent superluminal motion between AGNs and GRBs with some relevant radio observations. It is found that the relationships involved above two kinds of explosions are largely different.

P14- GRBs from Black-Hole Binaries
Enrique Moreno Mendez

The Collapsar model, in which a fast-spinning massive star collapses into a Kerr BH, has become the standard model to explain long-soft gamma-ray bursts and hypernova explosions (GRB/HN), however, stars massive enough (those with ZAMS mass larger than some 20 solar masses) to produce these events evolve through a path that loses too much angular momentum as to produce a central engine capable of delivering the necessary energy. In this work we study the soft X-ray transient sources as the remnants of GRBs/HNe; that is, binaries in which, as the massive primary star evolves a C-O burning core, it starts transferring material to the secondary star (Case C mass transfer), shrinking the orbit until a common-envelope evolution sets in and the secondary spirals in, further narrowing the orbit of the binary and removing the H envelope of the primary star; eventually the primary star becomes tidally locked and gets spun up acquiring enough rotational energy to power up a GRB/HN explosion. The central engine producing the GRB/HN event being the Kerr BH through the Blandford-Znajek mechanism. It turns out that our model can explain not only the long-soft GRBs, but also the subluminous GRBs, which comprise ~97% of the total. Because of our binary evolution through Case C mass transfer, it turns out that for the subluminous
and cosmological bursts, the angular momentum is proportional to the 1 to 3/2 power of the mass of the donor (secondary star). This gives the binary evolution a great advantage over the Woosley Collapsar model; namely, that one can ``dial" the donor mass in order to achieve whatever angular momentum is needed to drive the explosion. Population syntheses show that there are enough binaries to account for the progenitors of all classes of GRBs.

P15- Coordinated observations of Sgr A*: Flaring activity in the NIR/mm
Devaky Kunneriath

We report a successful, simultaneous observation and modelling of the mm to NIR flare emission of Sgr A* from a global coordinated multiwavelength campaign in May 2007 and 2008. A multi-component relativistic spot/disk model and an adiabatic expansion model in combination with a Synchrotron Self-Compton (SSC) formalism is used to explain this flaring activity, where a mix of synchrotron and SSC components orbiting around the SMBH in a temporary accretion disk give rise to the NIR/X-ray light curves, and an adiabatic expansion of these source components later give rise to the flares in the radio/sub-mm with a time delay. The short timescales of the flares indicate that the emission arises from compact source components.

SESSION II: **MHD STEADY JET PRODUCTION AND SHOCK-IN-JET THEORY**

Magnetic Acceleration of Relativistic Jets
S. Komissarov

It is now widely believed that most types of astrophysical jets are magnetically accelerated. In this talk I will outline the key features of the magnetic mechanism, briefly review the results of some recent theoretical and numerical studies, and speculate about the possible future developments.

Shock-in-Jet Model for Quasars and Microquasars
M. Turler

We present the basic principle and assumptions of the shock-in-jet model. We then show how the expected evolution of a synchrotron outburst from a shock wave in a relativistic jet can be analytically described and parameterized to be fitted to multi-frequency lightcurves of galactic and extragalactic sources. As an illustration, we present results of infrared-to-radio lightcurve fitting by a succession of self-similar outbursts in two blazars, 3C 273 and 3C 279, and in two microquasars, Cyg X-3 and GRS 1915+105. We find trends in the properties of outbursts in a same source and discuss differences in the derived physical conditions (magnetic field strength and electron energy distribution) of jets in quasars and microquasars. As a curiosity we construct simulated jet images, which we compare to interferometric radio observations. We conclude by presenting a first attempt to include the associated synchrotron self-Compton emission at X-rays and gamma-rays in 3C 279 and outline future work in this area.

Formation of MHD jets and flares as trigger of internal shocks
C. Fendt

I will present recent results of MHD simulations of jet formation. Two different simulation setups will be considered. In the first approach the role of the disk magnetic flux profile and disk mass loss profile is investigated concerning the jet collimation degree. Our results suggest (and quantify) that in general outflows launched from a very concentrated region close to the inner disk radius tend to be uncollimated. In the second approach, jet formation is numerically investigated from a magnetic field configuration consisting of a stellar dipole plus a disk field. The central dipole is found to de-collimate the disk wind considerably. Reconnecting flares are launched by the interaction of the disk and stellar magnetic field and may change the overall mass flux in the outflow by a factor of two.

New evidence for extreme particle acceleration in microquasars
E. Striani, M. Tavani et al.

We present and discuss the latest results of the AGILE gamma-ray satellite regarding the observations of Galactic microquasars and other Galactic transients. In particular, we will focus on the remarkable AGILE detections of Cygnus X-3 and Cygnus X-1, that can be used to contrain the extreme particle acceleration in microquasars. Gamma-ray emission above 100 MeV appears to be sporadic, and related to special emission states. In the case of Cygnus X-3, the gamma-ray emission appears is clearly associated with pre-radio-flare states. The on-going multifrequency efforts in the Cygnus region will be briefly discussed.

P16- Two component jet acceleration and synchotron maps of the simulated jet base.
Oliver Porth

I will show results from axisymmetric relativistic MHD simulations of jet acceleration. The prospective jet fed into the computational domain consits of an inner poynting dominated component from the rotating black hole and an outer disk wind. Both components accelerate through the slow and fast magnetosonic points in simulations that cover the inner parsec of an active galacitc nuleus. This inner region is within the reach of present VLBI experiments. I will present synchotron radiation maps and spectra for the simulations after settling into a quasi steady state.

P17- Flare-like outbursts from loading of the jets?
Joni Tammi

I discuss the possibility that the event that loads the jet with matter from the accretion disk or the surrounding corona could also cause a flare looking like those happening in the jet. I present preliminary results of an ongoing study, obtained using a simple toy model created to test the hypothesis that a wind-like expansion of plasma originating from the collapsed accretion disk can produce short optical and X-ray flares preceding the strong multifrequency flares associated with new emission features becoming visible in the jet. The early results suggest that these non-jet flares could be happening in certain AGNs; I discuss the feasibility of the proposed model and present both qualitative and quantitative predictions for testing the hypothesis.

P18- Radiative signatures of relativistic shocks
B. Reville and J. G. Kirk

Particle-in-cell simulations of relativistic, weakly magnetized collisionless shocks show that particles can gain energy by repeatedly crossing the shock front. This requires scattering off self-generated small length-scale magnetic fluctuations. The radiative signature of this first-order Fermi acceleration mechanism is important

for models of both the prompt and afterglow emission in gamma-ray bursts and depends on the strength parameter "a" of the fluctuations. For electrons (and positrons), acceleration saturates when the radiative losses produced by the scattering cannot be compensated by the energy gained on crossing the shock. We show that this sets an upper limit on both the electron Lorentz factor and on the energy of the photons radiated during the scattering process. This rules out "jitter" radiation on self-excited fluctuations with $a < 1$ as a source of gamma-rays, although high-energy photons might still be produced when the jitter photons are upscattered in an analog of the synchrotron self-Compton process. In fluctuations with $a > 1$, radiation is generated by the standard synchrotron mechanism, and the maximum photon energy rises linearly with a, until saturating at approximately 70 MeV.

P19- Two shell collisions in the GRB afterglow phase
Alkiviadis Vlasis, H.J van Eerten, Zakaria Meliani, Rony Keppens

Strong optical and X-Ray flares often appear in the afterglow phase of Gamma-Ray Bursts (GRBs). In order to explore these events we perform high resolution numerical simulations of late collisions between two ultra-relativistic shells. Such consecutive shells can be formed due to the variability in the central source of a GRB. We examine the case where a cold uniform shell collides with a self similar Blandford and McKee shell (Blandford \& McKee 1976) in a constant density environment and consider cases with varying Lorentz factor for the uniform shell. We produce the corresponding light curves and spectra for the afterglow phase and examine the occurrence of optical flares in the several cases. We conclude that occurrence of optical flares is possible for small opening angles of the jet. For our simulations we use the Adaptive Mesh Refinement version of the Versatile Advection Code (Keppens et al. 2003; Meliani et al. 2007) and the radiation code BLAST (van Eerten & Wijers 2009).

P20- Spectra and energies of cosmic rays in young supernova remnants.
Klara Schure

Cosmic ray acceleration in supernova remnants (SNRs) is attributed to the process of diffusive shock acceleration. The maximum energy to which the cosmic rays are accelerated in SNRs is believed to be around 10^15 eV, close to the break ("knee") in the cosmic ray spectrum observed on Earth. Many models exist that treat cosmic ray acceleration in the steady state approximation. We will present our Monte Carlo method that follows particle acceleration over the lifetime of the SNR. This method shows that the maximum-attainable energy depends on the background into which the supernova explodes. Type Ia supernovae typically go off in a uniform-density medium, whereas many Type Ib/c-II explode into a medium with a 1/r^2 density profile. We show that in the latter case much higher cosmic ray energies can be attained for the same explosion energy.

P21- The signature of velocity gradients in the gamma-ray spectra of blazars.
Markos Georganopoulos

We discuss how Fermi observations of blazars and radio galaxies can be used to probe spatial gradients in the radiating plasma velocity.

P22- Transient black hole binaries as seen by INTEGRAL/IBIS
Fiamma Capitanio

Most of the sources reported in the fourth IBIS/ISGRI catalogue are classified as transient sources. A big number of these transients are classifed as probable BH X-ray Binaries. We will present here a systematic study on the high energy behaviour of these sources comparing the different characteristics of their outbursts and searching for possible counterparts in different energy bands in order to fix nature of these objects.

P23- A multi-band flare in the M87 jet 80 pc away from the central engine
Chin-Shin Chang

The radio-loud active galactic nucleus M87 hosts a powerful jet fueled by a super-massive black hole in its center. A bright feature 80 parsec away from the central engine of M87, namely HST-1, has shown a multi-band flare peaked in 2005. Early radio, optical and X-ray observations have suggested that HST-1 is superluminal, and is possibly related to the TeV flare observed by HESS around 2005. Therefore, it was suggeted that HST-1 has a blazar-like activity. To examine the blazar-like nature for this superluminal knot in the M87 jet, we analyzed VLBA 2cm data of 15 epochs from 2000 to 2009. HST-1 is succesfully detected with milliarcsecod resolutions from 2003 to 2007, and our findings do not support that HST-1 has a blazar-like nature.

P24- Astrophysical jets : what can we learn from solar ejections?
Giannina Poletto and Maria Massi

Astrophysical systems display a variety of phenomena that appear quite different because of the enormous variations in spatial scales and/or in the involved energies. However, this impression may be only partially justified: for instance, the structures of magnetic coronae of accretion disks and the solar atmosphere are recognized to present striking similarities. The Sun is indeed an ideal astrophysical laboratory to investigate common physical processes in events occurring in different
environments. Building up on this idea, we review here the large variey of solar ejections, from the spectacular large scale Coronal Mass Ejections (CMEs), to the most recent findings, where an unexpected high number of tiny and ubiquitous jets (including micro CMEs) has been detected. Special emphasis is given to the reconnection processes that occur in these events and the properties of Current Sheets occasionally identified in CMEs.

P25- Magnetic reconnection signatures in the solar atmosphere: results from multi-wavelength observations
F. Zuccarello, S. L. Guglielmino and P. Romano

Magnetic reconnection is a process that occurs when differently directed magnetic field lines are brought together into a volume, called diffusion region, where they can break and successively reconnect. As a consequence of this process the magnetic field lines change their connectivity, particles can be accelerated, and plasma can be ejected from the reconnection site. The energy released during the reconnection heats the plasma and produce several observational signatures. This mechanism has been recently invoked to explain activity in AGNs (Sikora et al. 2005; Sikora et al. 2009). On the other hand, in the solar atmosphere magnetic reconnection is invoked as the main mechanism causing very energetic events (10^{28} – 10^{32} erg), like flares and coronal mass ejections (CMEs), as well as other less energetic phenomena, like microflares, X-ray jets and chromospheric surges. In the last decade, thanks to high-resolution, multi-wavelength observations carried out by both ground-based telescopes (SST, VVT, DST) and space-born satellites (SOHO, TRACE, HINODE), it has been possible to study these phenomena and several signatures of the occurrence of magnetic reconnection have been singled out. In this poster, we describe the results obtained from the analysis of multi-wavelength observations carried out in the last years, with special emphasis on those events that were characterized by plasma outflows from the reconnection site. In particular, the events here described are relevant to some active regions observed on the Sun, characterized by the interaction of different bundles of magnetic flux tubes, as a consequence of emergence of new magnetic flux from the subphotospheric layers and/or of shearing and twisting of the magnetic field lines. We report on these phenomena in order to give a contribution to the possibility to find a similarity with jets observed in AGNs.

P26- Magnetic fields along massive protostellar jets. The case of W75N and Cepheus A.
Wouter Vlemmings and Gabriele Sourcis

The role of magnetic fields during the protostellar phase of high-mass star-formation is a debated topic. In particular, it is still unclear how magnetic fields influence the formation and dynamics of disks and outflows. Most current information on magnetic fields close to high-mass protostars comes from polarized maser emissions, which allow us to investigate the magnetic field on small scales by using very long baseline interferometry. Recently, by using masers observations at 6.7 and 22 Ghz, we were able to detect anordered magnetic field along massive protostellar jets. In one case, we were also able, for the first time, to determine the three-dimensional magnetic field around Cepheus A HW2. The magnetic field is perpendicular to the protostellar disk and parallel to the jet.

P27- Molecular outflows from YSOs
Keping Qiu and Silvia Leurini

In the formation of Sun-like stars, the central young stellar object (YSO) accretes gas through an equatorial disk embedded within an infalling envelope. In this process, excess angular momentum of the infalling matter
is thought to be carried out by a fast bipolar wind which is magnetocentrifugally driven from the accretion disk. The wind in turn entrains or sweeps up ambient material into a molecular outflow which is observable in rotational transitions of CO and other molecules at mm/submm wavelengths. This poster gives a short review of high-angular-resolution observations and leading models of molecular outflows from low-mass YSOs.
Recent efforts searching for rotation of highly-collimated outflows, which can be strong evidence for dissipation of excess angular momentum by a YSO wind/outflow, are presented as well.

P28- A wide-angle tail galaxy at z = 0.53 in the COSMOS field
Antonija Oklopcic

Wide-angle tail (WAT) galaxies are radio galaxies whose jets are bent forming a wide C shape. The bending of the jets is a result of ram pressure being exerted on the jets, due to the relative motion of the host galaxy and the intra-cluster medium. WATs are usually found in dense environments like galaxy clusters or groups, and their presence is thought to be a strong indicator of dynamically young, non-relaxed systems. We present an analysis of a WAT galaxy located in a galaxy group in the COSMOS field at the redshift of z = 0.53 (CWAT-02). An in-depth study of CWAT-02 and its surroundings reveals many indications that this system is dynamically young and likely in the process of an ongoing group merger. We analyze the radio jets of CWAT-02 and present an estimate of discrepancy between the observed and the intrinsic luminosity, due to Doppler beaming of the relativistic jets. Taking the unrelaxed state of the CWAT-02's host group into account, we finally discuss the impact of radio-AGN heating from CWAT-02 into its environment, in the context of the missing baryon problem in galaxy groups.

SESSION III: JETS AND HIGH-ENERGY EMISSION

Correlation between X-Ray and Gamma-Ray Emission in TeV Blazars

Krzysztof Katarzynski

The observations of TeV blazars show an unexpected quadratic or even cubic correlation between the X-ray and TeV gamma-ray emission ($x \gtrsim 2$), were the correlation is defined as a simple power-law relation between the observed fluxes $F_{\rm TeV}(t) \propto F^x_{\rm X-ray}(t)$.
We will demonstrate that a standard model of the synchrotron self-Compton emission of a compact source inside a jet is not able to explain such a correlation. Therefore, we propose an alternative scenario where the emission of a least two independent compact components is observed at the same time.

Radio Jets and High Energy Emission in Microquasars

Josep Maria Paredes

The discovery of non-thermal X-ray emission from the jets in some X-ray binaries, and especially the discovery of TeV gamma-rays in some of them, provide a clear evidence of very efficient acceleration of particles to multi-TeV energies in these systems. The observations demonstrate the richness of non-thermal phenomena in compact galactic objects containing relativistic outflows or winds produced near black holes and neutron stars. Especially interesting are also the signatures of interaction between these relativistic outflows and the surrounding ISM, as in the case of Cygnus X-1. I will summarise here some of the main observational results on the non-thermal emission from X-ray binaries as well as some of the proposed scenarios to explain the production of high-energy gamma-rays.

Spectral Energy Distribution of Gamma-Ray Binaries
Valenti Bosch-Ramon

Gamma-ray binaries are very suitable sources to study high-energy processes in jets and outflows in general. In the last years, there has been a lot of activity trying to identify the different factors that shape the non-thermal spectrum in gamma-ray binaries, which goes from radio to very high energies. In this talk, I will summarize the main aspects of the non-thermal emission in these objects, as well as briefly discuss the role of their powerful outflows as sites of particle acceleration and radiation.