to the radio jet. This means that: (1) both ionizing radiation and relativistic particles are escaping through holes in the torus perpendicular to the radio jet; and/or (2) the torus is also outflowing, as proposed by recent models of tori as winds from the outer parts of an accretion flow; or (3) the torus is absent in NGC 5929.

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CHROMATIC MICROLENSING IN HE0047-1756 AND SDSS1155+6346

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The gravitational lens effect occurs when the light is deflected in the presence of a gravitational field, generating multiple images or arcs. Microlensing happens when a compact object, in the lens galaxy halo, passes across a quasar lensed image.

We analyzed two double systems: HE0047-1756 and SDSS1155+6346. We used spectra obtained with Magellan/IMACS (2007) and MMT/BlueChannel (2008). The flux of emission line cores was separated from the continuum flux under them and integrated using DIPSO software. Comparing the magnitude differences in the emission line cores with the magnitude differences in the continuum under the lines (Motta et. al 2012), we found evidence of chromatic microlensing in HE0047-1756 and SDSS1155+6346.

Emission line core fluxes are used to model the systems with *lensmodel*. SIS + γ are the best models in both cases, which are in agreement with literature. SDSS1155+6346 model shows a large shear, due to the presence of MaxBCG J178.81693+63.83446 cluster.

We follow Mediavilla et al. 2011, modeling the accretion disk as a Gaussian intensity profile $I(R) \propto \exp(-R^2/2r_s^2)$, with $r_s(\lambda) \propto \lambda^p$, where r_s is the accretion disk size and p is the power law related to the temperature of the disk $p = 1/\beta$. We estimate the probability of r_s and p using the measured microlensing magnification with linear and logarithmic priors on r_s. We found within 1σ of uncertainty, sizes between 3 and 15 light days and temperature profiles values between 1 and 1.2. These values are in agreement with the literature and Shakura & Sunyaev (1973) prediction.

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CHARACTERIZING THE ENVIRONMENT OF THE BLAZARS PG1553+113 AND 3C66A FROM GEMINI-GMOS DATA IN THE I' AND G' BANDS

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Blazars are active galactic nuclei (AGNs) which, because of their particular orientation with respect to the observer, are characterized by beamed electromagnetic emission from a relativistic jet. It is thus challenging to detect either continuum or line radiation from the nucleus or from the host galaxy; in many cases this prevents the measurement of a spectroscopic redshift. However, the analysis of their environments may give valuable information, considering that galaxies in the blazar's field could share physical and chemical properties with the host galaxy, besides having a similar redshift. We have thus undertaken a photometric study of the galaxies in the fields of the blazars PG1553+113 and 3C66A, based on g' and i' images taken with the GMOS instrument (multi-object spectrograph and camera) at Gemini North 8m telescope. Our goal is to look for concentrations of galaxies around both blazars in order to have a first knowledge of the general characteristics of their immediate environments.

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FHILS IN SEYFERTS AND LINERS IN THE OPTICAL SPECTRA

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We present the main results from a selection of optical spectra of Seyfert and LINER galaxies taken from the 9^{th} release of the SDSS with detectable emission of forbidden high ionization lines (FHILs), better known as coronal lines. A catalog of 345 Seyfert 1 (Sy1) and Seyfert 2 (Sy2) galaxies with FHILs emission is presented. By analyzing their spectra and utilizing data from the literature we found the following results: (1) The flux ratios between FHILs suggests anisotropy of emission between Sy1 and Sy2 galaxies, which agrees with the results found by Nagao et al. (2002) and Portilla (2012). Sy1 seems to emit more FHILs than Sy2. (2) This anisotropy suggests the idea that an important, but not the majority, of the emission of FHILs comes from the inner part of the obscuring torus. (3) We present diagnostic diagrams between FHILs lines which indicate clear correlations between the flux ratios. (4) It is observed that the ratio of Ne V/Fe VII is of the order of 3 to 10, while the ratios between iron lines (i.e., Fe VII, Fe X, Fe XI) are roughly around the unity. (5) At least in the optical spectra, the present study continues to support the general idea that LINERs are not energetic enough to present FHILs. A complete version of this study including the catalog with the objects of study, and diagnosis diagrams using only this kind of lines can be found in Vera & Portilla (in prep).

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HIGH ENERGY ASTROPHYSICS

DECAY OF MAGNETIC FIELD IN BLACK WIDOW PULSARS

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A small fraction of the binary relativistic systems display the "black widow" effect: the companion is being ablated by the (recycled) pulsar wind. In these binary systems the evolution of the companion star (of the solar-type) reaches the point of filling its Roche lobe, thus initiating the process of mass accretion onto the pulsar. Accretion is generally believed to result in magnetic field decay, while isolated neutron star fields decay very slowly, if at all. We shall show that the very long evolution of the "black widow" system, starting from a solar-type star and lasting > 5 Gyr to reach the observed position in the plane, allows us to conclude that the magnetic field does not decay below the bottom value , extending the previous conclusions drawn from younger systems. In addition, the masses of the "black widow" pulsars are naturally predicted to be > 2 Mo due to the accretion history, in full agreement with recent measurements.

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RADIATION-HYDRODYNAMIC MODEL OF HIGH-MASS X-RAY BINARIES

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The topic of circumstellar matter in the X-ray binaries and its spectroscopic diagnostics is addressed by method of generating synthetic Dopplerograms for direct comparison with observations. The presented results were obtained using our improved three-dimensional radiation-hydrodynamic model of the stellar wind in HMXBs. We use the model to simulate dynamics, anisotropy and other characteristics of the wind, e.g. the density distribution and ionization structure. We adopt parameters of Cygnus X-1 in our simulations and use the Doppler tomography to probe the structure of radiation-emitting material in the system. We introduce a data interpretation method of observed Doppler tomograms via direct comparison with synthetic Dopplerograms obtained from our model. We test the reliability of the model as well as set constrains on various physical parameters and processes, e.g. the accretion rate. We take into account the Coriolis force, the ionization structure of the medium, the gravity darkening, and we investigate the effects these phenomena have on the accretion process. E.g. the Coriolis force substantially influences the mass-loss of the donor and by that the accretion rate of the compact companion. Additionally, focusing of the stellar wind by the gravitational field of the compact companion leads to the formation of an unstable gaseous tail behind the companion. This tail shows signs of quasi-periodic oscillations and its existence presents us with other means to explain the switching mechanism among the various X-ray states.