Report on

The visit of Prof R. Sunyaev to ESO/Chile and the Topical Meeting "Accretion onto Compact Objects"

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Over the period April 4 to April 17, we had the great pleasure of the visit of Prof. Rashid Sunyaev in Chile. This was an opportunity for him to visit some of ESO's facilities (Paranal, Santiago) as well as APEX, and also to pay a visit to the new facilities of our colleagues in La Serena (among others Magellan and Gemini).

For us, it was an opportunity to organize discussions and meetings to make use of his vast experience in the field of cosmology and high energy astrophysics.

On this occasion we held a Topical Meeting in Santiago, on April 15, on the subject of: "Accretion onto Compact Objects". About 30 participants attended the Meeting, among them many students from PUC and from ESO. Presentations ranged from theory (the theory of accretion, the evolution of low-mass X-ray binaries and millisecond pulsars controlled by gravitational radiation, the mapping of eccentric orbits in triaxial log potential, …) to observational results (echo-sounding in X-ray binaries, warped molecular gas around AGN, formation of high mass stars via accretion, …).

Theoretical problems in astrophysics are discussed only occasionally in Chile, as the astronomical activity is really dominated by observational subjects thanks to a top-level suite of telescopes. So, this provided an interesting change and gave new perspectives to the young audience at the *Topical Meeting*.

Report on the ESO Conference:

Planetary Nebulae beyond the Milky Way

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This three-day ESO workshop, held from 19 to 21 May 2004, devoted to extra-galactic planetary nebulae (PN), was the first full workshop on the topic. Previously there had been discussions of extra-galactic PN on the final day of the pentennial IAU Symposium on Planetary Nebulae (last held in Canberra in 2001) and a one day meeting during the IAU General Assembly in den Haag in 1994. The field has expanded considerably in the last decade with many PN now detected in Local Group galaxies, extensive surveys underway in nearby early-type galaxies and in the intergalaxy regions of galaxy clusters, together with the use of PNe as kinematic probes for galaxy potentials. There are currently many thousands of PN catalogued in external galaxies, far surpassing the approximately 1500 known in the Milky Way.

Alan Moorwood, Head of Instrumentation at ESO, in his welcome address presented a reflection from his attendance at a PN Symposium in New York in 1977. He noted that the order of the first few talks at this workshop – on surveys in the Magellanic Clouds and Local Group galaxies – was similar to that 27 years before.

However after a few talks, Alan had to agree that a lot had happened in the field since 1977! There were 16 invited reviews, 26 contributed talks and two discussion sessions over three full days, and also 13 posters, for a total of 65 participants. We present a selection from among the topics. Since all the speakers presented their talks in electronic form we collected them together after the conference and made them available linked to the items in the conference programme at http://www.eso.org/gen-fac/meetings/extgalpn04/programme.html where the reader is referred for more details.

The first extra-galactic PN were those discovered in the Magellanic Clouds and surveys are still on-going. G. Jacoby (WIYN) suggested that all the PN had been probably been discovered in the SMC, whilst many more remain to be discovered in the LMC. The cumulative plot of the number of PN against the magnitude in the [OIII] 5007Å line – known as the PN Luminosity Function (PNLF) – showed a dip at about four magnitudes below the peak for the SMC (see Figure 1). This was subsequently referred to as "Jacoby's deficit". The photographic Hα survey of the UK Schmidt Telescope in Australia is still discovering many more LMC PN. W. Reid (MacQuarie University) showed how the Hα and matched *R*-band images are differenced to reveal more than a thousand new PN candidates in the LMC, which are then followed up with multi-object fibre spectroscopy on the AAT.

In other Local Group galaxies the census of PNe conducted with the Wide Field Camera at the Isaac Newton Telescope was presented by R. Corradi (ING). Local Group dwarf galaxies were surveyed in various narrow and broad filters and the images are reduced and publically available. L. Magrini (Firenze), P. Leisy (ING) and collaborators discussed spectroscopy of some of the candidates from this survey. The census of PN in the Local Group is complementary to various Asymptotic Giant Branch (AGB) stellar surveys which were summarized by M. Groenewegen (Leuven). The AGB surveys form not only an important test of stellar evolution models, but also an excellent tool for studying chemical evolution of dwarf galaxies.

Deep surveys in nearby galaxy clusters such as Virgo and Fornax reveal the presence of true intra-cluster PN. J. Feldmeier charted the discovery of these objects. The early surveys were beset by interlopers, mostly z=3.1 Lyman-alpha galaxies; but later surveys with spectroscopic follow-up (detection of the [O III] 5007,4959Å doublet allows clear discrimination from background emission line objects) are revealing numbers of PN wandering in the spaces between galaxies. The intra-cluster PN have enormous potential for studying the number, origin, metallicity and kinematics of the intra-cluster stars. Current estimates suggest that about 15% of cluster stellar mass may reside in intra-cluster stars. Multi-fibre instruments on large telescopes show that it is feasible to measure the kinematics of the intra-cluster PN and M. Arnaboldi showed some Virgo PN spectra recently taken with FLAMES on the VLT.

The PNLF is now an established secondary distance indicator and R. Ciardullo in his review showed that the first suggestion that PN could be used as distance indicators was made in 1966. It was not until the 1990's that the PNLF was routinely applied to nearby early-type galaxies. The method works comparably well to surface brightness fluctuations with very little dependence on metallicity of the galaxy. The next challenge for the observers is to compare the PNLF constructed from Hβ and other lines with the [O III] 5007Å PNLF.