Cosmology and Large Scale Structures

1 Topics

This topic follows from the extensive work performed at the University of Arizona in Tucson by Prof. Fang LiZhi, and constitutes an important bridge of scientific collaboration with China initiated by Fang. The leading person who is planning to collaborate is Prof. Xiaohui Fan, regent professor at Tucson and representative of Tucson in the ICRANet Steering Committee. The relevant Topics led by Prof. Fan are:

-) Panstarrs PS1 survey of $z \sim 7$ quasar: a survey of quasars at $z = 6 - 7.5$, using the $20,000$ sq. deg Y band data taking with Panstarrs1 PS1 telescope is being conducted.

-) SDSS III quasar survey: a sample of faint high-redshift quasars using SDSS-III spectroscopy is being established.

-) ALMA studies of quasar host galaxies: deep observations of $z \sim 6$ quasars are being carried out using ALMA to probe star formation and mass of quasar host galaxies and the evolution of black hole/galaxy correlation at high-redshift.

-) The highest redshfit quasar lenses: a HST survey of the most distant lensed quasars is being conducted to study both lensing properties and use them as a tool to probe their host galaxies.

-) Black hole masses among $z \sim 6$ quasars: a Magellan/VLT survey of $z \sim 6$ quasars is being conducted to measure their BH masses and growth rates.

-) Studying galaxies in the reionization epoch using HST: a number of HST programs are being carried out to search for and study primordial star formation in $z \sim 7$ galaxies.

-) LBT survey of $z > 7$ galaxies: a Ly alpha survey of $z \sim 7$ galaxies is being carried out using the multiobject near-IR spectroscopy on the Large Binocular Telescope.

-) Ultraluminous star forming galaxies at $z \sim 3$: a systematic survey of the most UV luminous galaxies at the peak era of cosmic star formation using LBT and MMT is being carried out.

The ICRANet Contribution will specially address the origin of Massive Black Holes from Dark Matter. See, e.g.:

- R. Ruffini, C.R. Argüelles, J.A. Rueda, "Dark matter massive fermions and Einasto profiles in galactic halos", *Monthly Notices of the Royal Astronomical Society*, **451** (2015) 622.

- I. Siutsou, C.R. Argüelles, R. Ruffini, "Dark matter massive fermions and Einasto profiles in galactic halos", *Astronomy Reports*, **59** (2015) 656.

- C.R. Argüelles, R. Ruffini, "A regular and relativistic Einstein cluster within the S2 orbit centered in SgrA*", in the *Proceedings of the Thirteenth Marcel Grossmann Meeting*, Vol. B (2015) 1734.

We are also capitalizing on the collaboration between Los Alamos National Laboratories (LANL) and Tucson University on High Performance Computing carried on by Chris Fryer, who is adjunct Professor in ICRANet. For the relevant topics led by Chris Fryer and Jorge Rueda, see, e.g.:

- C.L. Fryer, J.A. Rueda, R. Ruffini, "Hypercritical Accretion, Induced Gravitational Collapse, and Binary-Driven Hypernovae", *The Astrophysical Journal*, **793** (2014) L36.

- L. Becerra, F. Cipolletta, C.L. Fryer, J.A. Rueda, R. Ruffini, "Angular Momentum Role in the Hypercritical Accretion of Binary-driven-Hypernovae", *The Astrophysical Journal*, **812** (2015) 100.

- C.L. Fryer, F.G. Oliveira, J.A. Rueda, R. Ruffini, "On the Neutron Star-Black Hole Binaries Produced by Binary-driven-Hypernovae", *Physical Review Letters*, **115** (2015) 231102.