Session:	**[B3B-5] S5 : Compact Objects, High Energy and Particle Astrophysics**
Date:	August 20, 2014 (Wednesday)
Time:	14:00~15:30
Room:	Room E (Room 107)
Chair:	Maurice van Putten (Sejong University)

[B3B-5-4] **15:00~15:15**

Black Hole Binaries from Galactic Nuclei

Hyung-Mok Lee (Seoul National University, Korea) and Jongsuk Hong

Gravitational waves predicted by the general relativity almost 100 years ago have been implicated indirectly only by astrophysical observations such as the orbital evolution of binary pulsars. The advanced detectors of gravitational waves will become operational in a few years and they are expected to make direct detection of gravitational wave signal coming from merging of binaries composed of neutron stars or stellar mass black holes from external galaxies. Current estimates of the expected rate of merger event of neutron star or black hole binaries are based on very limited number of observed binary pulsars with careful considerations on the observational biases, stellar evolution, including binary phases, and dynamics of dense star clusters. Therefore these estimations vary several orders of magnitude depending on assumed parameters and models. We concentrate on the expected rates of the black hole binaries originated from galactic nuclei star clusters (NC) purely based on the dynamical considerations. The NCs with central supermassive black holes (SMBHs) are modeled stars representing the stellar mass BHs together with the additional potential due to the central black hole and bulge in the N-body simulations. In such an environment, binaries are predominantly formed by the gravitational radiation (GR) as a result of close encounters. Most of the binaries have very eccentric orbits (1-e ~10^-4) with very small presenter distances. The merging time after the formation of the binary is much shorter than any other dynamically relevant time scales. They will produce waveforms quite different from the ones with circularized orbits as they remain eccentric when they enter the aLIGO/Virgo bands. We find that the overall formation rates for BH-BH binaries per NC is 10^-10 per year for the Milky-Way-like galaxies, corresponding to order of 0.02 to 15 events per year within the aLIGO/Virgo horizons. However, several factors such as the dynamical evolution of the cluster, the variance of the number density of stars and the mass range of MBH give uncertainties by a large factor (more than two orders of magnitude).

[B3B-5-5] **15:15~15:30**

The White Dwarf Luminosity, Mass and Age Functions as Revealed by the LAMOST Survey of the Galactic Anti-Center

Alberto Rebassa-Mansergas (Peking University, China), Xiaowei Liu, Haibo Yuan, Ruxandra Cojocaru, Enrique Garcia-Berro, and Santiago Torres

The white dwarf population observed by a given survey can be used to determine white dwarf space densities, which allows to obtain the white dwarf luminosity function (LF), mass function (MF) and age function (AF). This exercise has been applied in the past to several different surveys. However, the white dwarf samples from which the currently observed LF, MF and AF are built are the result of complicated target selection algorithms and it becomes impossible e.g. to derive accurate white dwarf formation rates. The LAMOST survey of the Galactic Anti-Center (GAC) follows a well-defined selection criteria aiming at providing spectra for all stellar sources in the GAC (including white dwarfs) so that they can be studied in a statistically meaningful way. This has a significant advantage over previous surveys because we can apply this well-defined selection criteria to a simulated white dwarf population and directly compare the resulting LF, MF and AF to the observed ones. This exercise is crucial to evaluate the completeness of the observed sample and to thus obtain true white dwarf space densities and formation rates. In this contribution I present and describe in detail the white dwarf LF, MF and AF as derived from the LAMOST survey of the GAC.