Evolution of Galactic Density Peaks in Constrained Random Field

Jeong, Harrey and Park, Chang-Bom
Department of Astronomy Seoul National University

To study the effect of primordial large-scale density fluctuations on the formation of clusters of galaxies and their physical properties, a set of controlled numerical simulations has been performed under the standard cosmology. The initial conditions were designed to have a 3σ perturbation in the background when the density field is smoothed with a Gaussian filter with radius of one-tenth of the length of simulation box. local densities at the final positions of CDM particles have been calculated to located "clesters of galaxies".

The physical properties of clusters such as the distribution of mass and the line-of-sight velocity dispersions have been studied. Clusters were classified into groups according ti their LOS velocity dispersions representing the richness. The number density of rich clusters found in the simulations is consistent with the observation.

We have found that regions of high backround density form more rich clusters. On the other hand, low density regions tend to form poor ones. Only the regions with initial backround density fluctuations exceeding 2σ produce rich clusters with $<\sigma^2_{LOS}>^{1/2} \geq 500 km\ s^{-1}$ irrespective of local density fluctuations. But in the regions where the smoothed backround density has a value near the mean, the local density fluctuation is more important to the formation of clusters.

The power spectrum and the auto-correlation function analysis shows a "richness bias" in the spatial distribution of clusters in the sense that rich object cluster more strongly. The strength of clustering bias consistent with the results of earlier works although only the qualitative comparison is available.

Effects of Gravitational Radiation on Three-Body Interactions of 10 $M_\odot$ Black Holes

Kyung Nam Kong and Hyung Mok Lee
Department of Earth Science, Pusan Nnational University

The formation of binaries and subsequent merging by gravitational radiation emission is important in the evoution of dense clusters of compact stars. If there exist 10 $M_\odot$ black holes in nuclei of galaxies, thsy form a subsystem with very small size within the "flat core" of the backround stars. If the core density is sufficiently via three-body processes. The inter actions between binaries and a single star are well studied subject. However, the effect of gravitational radiation could be important for the case

of cluster containing 10 $M_{\odot}$. In the present study, we compute three-body interactions including gravitational radiation reaction by using regularized scheme. we find that a large fraction of binary-single reactions leads to the "merger" of two black holes due to the energy loss by gravitational radiation.

Generation of Primordial Magnetic Field During Inflationary Phase Transition

Soo-Jong Rey
Department of Physics and Center for Theoretical Physics
Seoul National University

Large-scale primordial magnetic field are generated during inflationary phase transition. We calculate the field spectrum exactly through a bogoliubov transfotmation during de Sitter space. Subsequent evolution of the primorial magnetic field during radiation dominated and matter dominated era are also discussed.

Precession of Supermassive Black Holes

Seok Jae Park
Korea Astronomy Observatory

In the previous work we made a long term evolution code for the central black hole in an active galactic nucleus under the assumption that the Blandford Znajek process is the source of the emission. Using our code we get the evoution of the angular velocity of the precession for a super-massive black hole. We consider a hole at the center of an axisymmetric, ellipsodial galactic nucleus. our numerical results show that, only for the cases such that the stellar density or the mass of the black hole is large enough, the precession of the black hole-presumaly the precession of the galactic jet-is interestingly large.

Pleiades 성단의 현재 질량함수와 Wielen Dip

이시우, 성환경
서울대학교 천문학과

Pleiades성단 중심 주위 $4^{\circ} \times 4^{\circ}$ 영역에서 V~21등급 ($M_v \sim 15.^m5$)까지 관측된 구성원 별들로부터 얻은 광도함수에서 $M_v \sim 7^m$ 에 dip이 존재하며, 이것은 국부항성계의 광도함수에서 보이는 wielen dip과 동일한 위치에서 나타난다. 그리고 광도함수의 최대치는 $M_v=12^m \sim 13^m$ 에서 나타나며, 이 위치는 국부항성계의 광도함수에서 보이는 tyrnover 점과 거의 같다. Pleiades 성단의 전반적인 광도함수의 형태는 국부함수의 경우와 같다. 또한 Pleiades 성단의 현재질량함수의 형태는 국부항성의 초기질량함수와 유사하다.