[구 GC-20] Environmental dependence of AGN activity in the SDSS main galaxy sample

Minbae Kim[1], Yun-Young Choi[2], Sungsoo S. Kim[1,2]
[1]*School of Space Research, Kyung Hee University*
[2]*Department of Astronomy and Space Science, Kyung Hee University*

We investigate the role of small-scale and large-scale environments in triggering nuclear activity of the local galaxies using a volume-limited sample with $M_r < -19.5$ and $0.02 < z < 0.0685$ from the Sloan Digital Sky Survey Data Release 7. To fix the mass of the supermassive black hole in its host galaxy, we limit the central velocity dispersion of the sample galaxies. The active galactic nuclei (AGN) host sample is composed of Type II AGNs identified with flux ratios of narrow emission lines with S/N >6. In this study, we find that the AGN fraction of late-type host galaxies are commonly larger than of early type galaxies. The AGN fraction of host galaxy with late-type nearest neighbor starts to increase as the host galaxy approaches the virial radius of the nearest neighbor (about a few hundred kpc scale). Our result may support the idea that the hydrodynamic interaction with the nearest neighbor plays an important role in triggering the nuclear activity of galaxy. The early-type galaxies in high density regions show decline of AGN activity compared to ones in lower density regions, whereas the direction of the environmental dependence of AGN activity for late-type galaxies is rather opposite. We also find that the environmental dependence of star formation rate is analogous to one of AGN activity except in the high density region.

[구 GC-21] Outflows in Sodium Excess Objects

Jongwon Park[1], Hyunjin Jeong[2], Sukyoung K. Yi[1]
[1]*Department of Astronomy, Yonsei University,*
[2]*Korea Astronomy and Space Science Institute*

van Dokkum and Conroy revisited the strong Na I lines at 8200Å found in some giant elliptical galaxies and interpreted it as evidence for bottom-heavy initial mass function. Jeong et al. later found a lot of galaxies showing strong Na D doublet absorption line at 5900Å (Na D excess objects; a.k.a. NEOs) and showed that their origins can be different for different types of galaxies. While the excess in Na D seems related with interstellar medium in late-type galaxies, smooth-looking early-type NEOs suggest no compelling sign of ISM contributions. To test this finding, we measured doppler shift in the Na D line. We hypothesized that ISM is more likely to show blueshift due to outflow caused by either star formation or AGN activities. In order to measure the doppler shift, we tried both Gaussian and Voigt functions to fit each galaxy spectrum near the Na D line. We found that Voigt profiles reproduce the shapes of the Na D lines markedly better. Many of late-type NEOs clearly show blueshift in their Na D lines, which is consistent with the former interpretation that the Na D excess found in them is related with star formation-caused gas outflow. On the contrary, early-type NEOs do not show any notable doppler component, which is also consistent with the interpretation of Jeong et al. that the Na D excess in early-type NEOs is likely not related with ISM activities but purely stellar in origin.

[구 GC-22] The Effects of Ram Pressure on Dwarf Galaxies

Rory Smith[1,2,3], Pierre-Alain Duc[2], Graeme Candlish[3], Michael Fellhauer[3], Yun-Kyeong Sheen[3], Brad Gibson[4]
[1]*Yonsei University, Seoul,*
[2]*CEA, Saclay,*
[3]*ConcepcionUniversity,*
[4]*University of Central Lancashire, Preston*

Using numerical simulations, we study the effects of ram pressure stripping on dwarf galaxies. It is commonly assumed that ram pressure only affects the gas component of a galaxy. We find that it actually can affect the dynamics of the stars too, and even the dark matter surrounding the disk - an effect dubbed 'ram pressure drag'. We study the effects of ram pressure drag on tidal dwarf galaxies, and find the response is very strong. Tidal dwarfs may be entirely destroyed by gas removal, and their stellar dynamics may appear heavily dark matter dominated where no dark matter exists. We discuss the consequences for tidal dwarf evolution, tidal streams, and disk galaxy evolution in general.

[구 GC-23] Effects of Magnetic Fields on the Gaseous Structures in Spiral Galaxies

Yonghwi Kim and Woong-Tae Kim
CEOU, Astronomy Program, Dept. of Physics & Astronomy, Seoul National University

Stellar spiral arms and magnetic fields in disk galaxies are important in the formation of gaseous

structures such as spurs/feathers and wiggles as well as in angular momentum transport between stars and gas. We present our recent results of global magnetohydrodynamic simulations to study nonlinear responses of self-gravitating and magnetized gas to an imposed stellar spiral potential. We vary the arm strength, the arm pattern speed, and magnetic field strength to explore various galactic situations. Magnetic fields not only reduce the peak density of galactic spiral shocks but also make angular momentum transport more efficient via magnetic pressure and tension forces. The extent and shapes of gaseous arms as well as the radial mass drift rate depend rather sensitively on the magnetic field strength. The wiggle instability apparent in unmagnetized models is suppressed with increasing magnetic field strength, while magnetic fields promote the development of magneto-Jeans instability of the arms and magnetic islands in between arms. We quantify the angular momentum transport by spiral shocks, focusing on the effects of magnetic fields. We also present physical interpretations of our numerical results and discuss astronomical implications of our findings.

[구 GC-24] Viscosity and Turbulence Dynamo in the Intracluster Medium

Jungyeon Cho
Chungnam National University

The origin of magnetic fields in the intracluster medium (ICM) is uncertain: it can be either primordial or astrophysical. Turbulence plays important roles in the origin of magnetic fields in the ICM. This is because turbulence can amplify a weak seed magnetic field very efficiently. The efficiency of the turbulence dynamo critically depends on the magnitude of viscosity: the smaller the viscosity is, the more efficient the turbulence dynamo is. In this talk, I'll discuss turbulence dynamo in both very small viscosity limit and very large viscosity limit. I'll show that when the viscosity in the ICM is comparable to the Spitzer viscosity, the origin of magnetic field in the ICM is likely to be astrophysical. On the other hans, when the viscosity is much smaller than the Spitzer value, the origin of magnetic field can be either astrophysical or primordial.

[구 GC-25] The evolution of Magnetic fields in IntraClusterMedium

Kiwan Park[1], Dongsu Ryu[1], Jungyeon Cho[2]

[1]*Dept. of Physics and Astronomy, UNIST, Ulsan, 689798, Korea,*
[2]*Dept. of Physics and Astronomy and Space Science, CNNU, Daejeon, 305764, Korea.*

IntraCluster Medium (ICM) located at the galaxy cluster is in the state of very hot, tenuous, magnetized, and highly ionized X-ray emitting plasmas. High temperature and low density make ICM very viscous and conductive. In addition to the high conductivity, fluctuating random plasma motions in ICM, occurring at all evolution stages, generate and amplify the magnetic fields in such viscous ionized gas. The amplified magnetic fields in reverse drive and constrain the plasma motions beyond the viscous scale through the magnetic tension. Moreover, without the influence of resistivity viscous damping effect gets balanced only with the magnetic tension in the extended viscous scale leading to peculiar ICM energy spectra. This overall collisionless magnetohydrodynamic (MHD) turbulence in ICM was simulated using a hyper diffusivity method. The results show the plasma motions and frozen magnetic fields have power law of $E_V^k \sim k^{-3}, E_M^k \sim k^{-1}$. To explain these abnormal power spectra we set up two simultaneous differential equations for the kinetic and magnetic energy using an Eddy Damped Quasi Normal Markovianized (EDQNM) approximation. The solutions and dimensions of leading terms in the coupled equations derive the power spectra and tell us how the spectra are formed. We also derived the same results with a more intuitive balance relation and stationary energy transport rate.

[구 GC-26] Radiation mechanism of gamma-ray burst prompt emission

Z. Lucas Uhm[1,2] (엄정휘), Bing Zhang[1,2,3]
[1]*Kavli Institute for Astronomy and Astrophysics, Peking University, Beijing 100871, China*
[2]*Department of Physics and Astronomy, University of Nevada - Las Vegas, Nevada 89154, USA*
[3]*Department of Astronomy, School of Physics, Peking University, Beijing 100871, China*

Synchrotron radiation of relativistic electrons is an important radiation mechanism in many astrophysical sources. In the sources where the synchrotron cooling timescale is shorter than the dynamical timescale, electrons are cooled down below the minimum injection energy. It has been believed that such fast-cooling electrons have a power-law distribution in energy with an index −2,