초기 비용을 투자하여 활용성이 높은 한문 문장 자동 번역기라는 연구 인프라를 확보하는 첫 적용 학문 분야이다. 향후 이를 활용한 고천문 분야 학술 활동이 더욱 활발해질 것을 기대해 볼 수 있다.

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[구 HE-06] Miller-Urey Experiments: Spectroscopy of spark discharge

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1953년에 밀러와 유리는 초기 지구 대기와 해양을 모사하여 단순한 기체 조합으로부터 유기분자를 얻었다. 생명의 기원을 논할 때 언급되는 밀러유리 실험을 교육 현장에서 활용하고 현대적으로 해석하고자 2014년에 Parker 등에 의해 재조명되어 단순화된 장치로 실험실을 설계하여 전기방전 실험을 진행하였다. 실험장치에 사용한 유리기구는 산, 염기로 각각 세척하고 200도씨 오븐에 건조하였다. 300ml 의 물을 반응 플라스크에 넣고, 83mmHg (11kPa) 압력의 진공상태에서 암모니아 100mmHg, 메탄 200mmHg, 질소 100mmHg를 주입하였다. 총 16일의 실험 기간중 66시간 방전을 하였다. 전기 방전 색이 하늘색에서 보라색으로 바뀌는 것을 확인하고 분광스펙트럼을 얻었으며, 시간에 따른 대기조성의 변화를 해석하고자 한다. 이 실험은 교내 창의연구활동 (R&E와 졸업개인연구)의 하나로 2015년부터 학생 주도적으로 진행되고 있다.

항성 및 항성계

[구 SA-01] Parameterizing the Perturbed Rotational Velocities of Planet-induced Gaps

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Recent submillimeter observations of ALMA reveal that many protoplanetary disks contain substructures like gaps or rings. The disk-planet interaction is believed to be the most likely gap formation scenario, and most previous numerical work attempted to constrain the planet mass using the density profiles of gas in the gaps. Since the dust and gas distributions likely differ from each other in protoplanetary disks, however, perturbed rotational velocities that directly probe the gas would give a more reliable estimate to the planet mass. In this work, we run two-dimensional hydrodynamic simulations to measure the amplitudes and widths of rotational velocity perturbations induced by planets with different mass. We present the parametric relations of the gap widths and depths as functions of the planet mass and disk properties. We also apply our relations to HD 163296 to infer the masses of embedded planets.

[박 SA-02] A detailed analysis of nearby young stellar moving groups

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Nearby young moving groups (NYMGs hereafter) are gravitationally unbound loose young stellar associations located within 100 pc of the Sun. Since NYMGs are crucial laboratories for studying low-mass stars and planets, intensive searches for NYMG members have been performed. For identification of NYMG members, various strategies and methods have been applied. As a result, the reliability of the members in terms of membership is not uniform, which means that a careful membership re-assessment is required. In this study, I developed a NYMG membership probability calculation tool based on Bayesian inference (Bayesian Assessment of Moving Groups: BAMG). For the development of the BAMG tool, I constructed ellipsoidal models for nine NYMGs via iterative and self-consistent processes. Using BAMG, memberships of claimed members in the literature (N~2000) were evaluated, and 35 per cent of members were confirmed as bona fide members of NYMGs. Based on the deficiency of low-mass members appeared in mass function using these bona fide members, low mass members from Gaia DR2 are identified. About 2000 new M dwarf and brown dwarf candidate members were identified. Memberships of ~70 members with RV from Gaia were confirmed, and the additional ~20 members were confirmed via spectroscopic observation. Not relying on previous knowledge about the existence of nine NYMGs, unsupervised machine learning analyses were applied to NYMG members. K-means and Agglomerative Clustering algorithms result in similar trends of grouping. As a result, six previously known groups (TWA, beta-Pic, Carina,