evolution of the tilted gas disk.

[구 IM-11] The centroid shift of Sgr A*

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The Galactic center, Sagittarius A* (Sgr A*), is the closest supermassive black hole and emits synchrotron radiation. It provides great opportunity to study the origin of mm/sub-mm emission. Currently, two competing models have been suggested as a jet base and a radiatively inecient accretion flow (RIAF). To unveil the properties, the extremely high resolution(~10μas) corresponding to the projected Schwarzschild radius of ~0.1AU is necessary. With KVN, a jet model can be tested by multi- frequency simultaneous observations because the optically thick surface in a jet (i.e. radio core) moves toward the center at a higher frequency. We conducted 8 observations with KVN at 43/86GHz in 2015, and found that the measured positional shift to the reference calibrator, J1744-3116, was ~0.3 mas to the south of Sgr A* using the source frequency phase referencing (SFPR) at Q/W bands for the first time. With the result, in the future, we will attempt to measure the variation of source position shifts that can constrain the direction of approaching jets and the variability of black hole activity of Sgr A*.

태양 및 우주환경

[박 SS-01] Statistical Studies on the Physical Parameters and Oscillations of Sunspots and Flares

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We perform three statistical studies on the physical properties and oscillations in the confined plasma such as a photospheric sunspot and confined coronal loop. From the statistical studies on the sunspot umbra and its oscillation, we find that (1) the total magnetic flux inside the umbra for the three groups increases proportionally with the powers of the umbral area and the power indices in the three groups significantly differ from each other; (2) the three groups have different characteristics in their umbral area, intensity, magnetic field strength, and Doppler velocity as well as their relationships; (3) the mean frequency of the umbral oscillations increases with the umbral mean magnetic field strength and height; (4) the time delay of the core intensity of Fe I absorption line relative to the continuum which are de-convolved with the frequency range higher than 3.5 mHz is mostly positive, implying that the photospheric umbral oscillations are likely upwardly propagating; (5) the umbral mean plasma beta ranges approximately 0.6-1.1 and does not vary significantly from pores to mature sunspots. From the comparative study on the quasi-periodic pulsations (QPPs) in the solar and stellar flares, (6) we find that the power index of the periods scaling the damping times observed in the stellar QPPs is consistent with that observed in the solar QPPs, suggesting that physical mechanisms responsible for the stellar QPPs are likely the magneto-hydrodynamic oscillation of solar coronal loops.

[구 SS-02] Anatomy of a flare-producing current layer dynamically formed in a coronal magnetic structure

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No matter how intense magnetic flux it contains, a coronal magnetic structure has little free magnetic energy when a composing magnetic field is close to a potential field, or current-free field where no volume electric current flows. What kind of electric current system is developed is therefore a key to evaluating the activity of a coronal magnetic structure. Since the corona is a highly conductive medium, a coronal electric current tends to survive without being dissipated, so the free magnetic energy provided by a coronal electric current is normally hard to release in the corona. This work aims at clarifying how a coronal electric current system is structurally developed into a system responsible for producing a flare. Toward this end, we perform diffusive MHD simulations for the emergence of a magnetic flux tube with different twist applied to it, and go