Propagating speeds of coronal mass ejections (CMEs) have been calculated by several geometrical models based on multi-view observations (STEREO/SECCHI and SOHO/LASCO). But in 2015, we were unable to obtain radial velocity of a CME because the STEREO satellites were located near the backside of the sun. As an alternative to resolve this problem, we propose a method to combine a coronal shock front, which appears on the outermost of the CME, and an EUV-wave that occurs on the solar disk. According to recent studies, EUV-wave occurs as a footprint of the coronal shockwave on the lower solar atmosphere. In this study, the shock, observed as a bubble shape, is assumed as a perfect sphere. This assumption makes it possible to determine the height of a coronal shock, by matching the position of an EUV-wave on the solar disk and a coronal shock front in coronagraph. The radial velocity of Halo-CME is calculated from the rate of coronal shock position shift. For an event happened on 2011 February 15, the calculated speed in this method is a little slower than the real velocity but faster than the apparent one. And these results and the efficiency of this approach are discussed.

고에너지 천체물리학

[구 HA-01] Timing analysis for the magnetar-like pulsar, PSR J1119-6127

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Studies on rotation-powered pulsars with strong surface magnetic field may help us clarify the unclear link between magnetars and canonical radio pulsars because the magnetar-like emission is expected to be observed. PSR J1119-6127 associated with SNR G292.2-0.5 has a high magnetic field of 4.1x1013 gauss, and a young characteristic age of ~1700 years can be served as the good candidate to compare with magnetars and rotation-powered pulsars. The glitch accompanied by the radiative changes detected in 2007 is the first case we observed for a rotationally powered radio pulsar. This pulsar experienced magnetar-like outbursts in mid. 2016, similar to the 2006 transition occurred on the other radio-quiet rotation-powered pulsar with strong surface magnetic field, PSR J1846-0258.

In this talk, I'll report the investigation with X-ray and gamma-ray data of this magnetar-like pulsar. A sudden decrease in the gamma-ray emission at the GeV band was detected immediately after the X-ray outburst. Accompanying with the disappearance of the radio pulsation, the gamma-ray pulsation cannot be resolved as well after the outburst. We tried to derive the timing behavior and some intriguing features of this pulsar in this work corresponding to the outburst using the Swift data, NuSTAR and XMM observations.

[석 HA-02] Measuring Timing Properties of PSR B0540-69

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Neutron stars (NS) are rapidly spinning compact objects. Their rotation energy is released by particles, electromagnetic waves, and even gravitational waves. The source of the energy is of course the rotation, so by studying the rotational properties of neutron stars, we can gain some insights into matter under extreme conditions. In particular, it is known that the braking index n is sensitive to the moment of inertia and/or NS winds. The neutron star PSR B0540-69 exhibits interesting timing behavior; previous measurements of the braking index for this pulsar may suggest a change in time. In order to see if the change is real, We investigate the timing properties of B0540-69 using recent ~1000-days Swift satellite data

[석 HA-03] Search for new magnetar candidates in Galactic plane.

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Magnetars are neutron stars powered by strong magnetic field ($B > 10^{14}$ G). Their spin period is in the range of 2 – 12s. The magnetic stress in the star may distort the crust (observed as outbursts), so magnetars (especially in outbursts) may emit gravitational waves. There are 29 magnetars known (potential gravitational waves sources), and increasing the number will increase the chance of detecting low-frequency gravitational waves. In addition, magnetars can be used for studying matter under extreme condition. In this study, we searched for more magnetars using extensive Chandra archival data and found 11 candidates. Due to the limited sensitivity of Chandra, form identification cannot be made, and more sensitivity X-ray data are needed.