the observed [O III] line profiles of type 2 AGNs can be well reproduced. In addition, we perform Monte Carlo simulations based on the different sets of model parameters. By comparing the model results with the observed [O III] kinematics of ~39,000 SDSS type 2 AGNs (Woo et al. 2016), we find that the observed [O III] velocity-velocity dispersion distribution is well reproduced by the biconical outflow model, enabling us to constrain the intrinsic physical parameters of outflows.

항성

[구 ST-01] KIC 6220497: A New Algol-type Eclipsing Binary with δ Sct Pulsations

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We present the physical properties of KIC 6220497 exhibiting multiperiodic pulsations from the Kepler photometry. The light curve synthesis represents that the eclipsing system is a semi-detached Algol with a mass ratio of q=0.243, an orbital inclination of i=77.3 deg, and a temperature difference of ΔT=3,372 K, in which the detached primary component fills its Roche lobe by ~87% and is about 1.6 times larger than the lobe-filling secondary. To detect reliable pulsation frequencies, we analyzed separately the Kepler light curve at the interval of an orbital period. Multiple frequency analyses of the eclipse-subtracted light residuals reveal 32 frequencies in the range of 0.75-20.22 d^{-1} with semi-amplitudes between 0.27 and 4.55 mmag. Among these, four frequencies (f_1, f_2, f_5, f_7) may be attributed to pulsation modes, while the other frequencies can be harmonic and combination terms. The pulsation constants of 0.16-0.33 d and the period ratios of P_{pul}/P_{orb} = 0.042-0.089 indicate that the primary component is a δ Sct pulsating star in p modes and, thus, KIC 6220497 is an oscillating eclipsing Algol (oEA) star. The dominant pulsation period of about 0.1174 d is considerably longer than the values given by the empirical relations between the pulsational and orbital periods. The surface gravity of log g_1 = 3.78 is significantly smaller than those of the other oEA stars with similar orbital periods. The pulsation period and the surface gravity of the pulsating primary demonstrate that KIC 6220497 would be the more evolved EB, compared with normal oEA stars.

[구 ST-02] The first photometric analysis of the close binary system NSVS 1461538

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The follow-up BVRI photometric observations of NSVS 1461538, which was discovered as an Algol/β Lyr eclipsing variable by Hoffman, Harrison & McNamara (2009), were performed for three years from 2011 to 2013 by using the 61-cm telescope and CCD cameras of Sobaeksan Optical Astronomy Observatory (SOAO). New light curves have deep depths both of the primary and secondary eclipses, rounded shapes outside eclipses and a strong O'Connell effect, indicating that NSVS 1461538 is a typical W UMa close binary system rather than an Algol/β Lyr type binary star. A period study with all the timings shows that the orbital period may vary in a sinusoidal way with a period of about 5.6 yr and a small semi-amplitude of about 0.008 d. The cyclical period variation was interpreted as a light-time effect due to a tertiary body with a minimum mass of 0.66M⊙. The first photometric solution with the Wilson-Devinney binary model shows that the system is a W-subtype contact binary with the mass ratio ($q=m_c/m_h$) of 3.46, orbit inclination of 85.6 deg and fill-out factor of 30%. From the existing empirical relationship between parameters, the absolute dimension was estimated. The masses and radii of the component stars are 0.28M⊙ and 0.71R⊙ for the less massive but hotter primary star, respectively, and 0.96M⊙ and 1.21R⊙, for the more massive secondary, respectively. Possible evolution of the system is discussed in the mass-radius and the mass-luminosity planes.

[구 ST-03] The First Photometric Study of the Neglected Contact Binary GX Aurigae

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New CCD photometric observations of GX Aur have been made between 2004 and 2015. Our light curves are the first ever compiled and display the variable O'Connell effect. The light variations are satisfactorily modeled by including time-varying cool-spots on the component stars. Our light curve synthesis indicates that the eclipsing pair is an A-type contact binary with parameters of i = 81.1 deg, ΔT = 36 K, q = 0.950 and f = 46%. Including