The Birth Rate of Ia Supernovae in Nearby Universe

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As an indicator of the expansion history of the universe, type Ia supernovae (SNe Ia) reveal the fact that the universe is experiencing accelerating expansion and lead to the historic discovery of dark energy. However, it is not certain about the characteristic of their progenitors as well as how they evolve with the cosmic redshift. The study of their birth rate in different galactic environments can help us understand the physics of their explosion and progenitor stars, providing important observational evidence for the study of star formation, evolution and cosmic dynamics. Due to the limitations of observational instruments and technology, previous study on the birth rate of SNe Ia has been affected by incomplete samples. Since 2013, numerous large-field telescopes have been put into the search of supernovae and their candidates, which provide a good foundation for the study of the birth rate of SNe Ia in nearby universe. Based on sample of SNe Ia (z=0.02) discovered in 2013-2016, we performed a detailed analysis of the birth rates of SNe Ia and the subtypes in the local universe. For all SNe Ia, we obtained a value of birth rate as SNR= (2.28±0.10) ×10-5 Mpc-3 yr-1, which is the latest and most precise result in this field. We also studied the SN Ia rate in different Hubble types of galaxies. The analysis for the SN rate of different subtypes still suffered large uncertainties in detailed spectroscopic classifications.

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