ASTROPHYSICS SEMINAR

日時 **2003年11月21日（金）4:00pm – 5:00pm**
場所 **3号館376室**
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題目 **Origin of High Speed of Neutron Stars**

講演要旨

The speed up mechanism of neutron stars with high space speed is the one of very difficult theoretical research program which attracts theoretical physicists' and astrophysicists' attention.

Four classes of mechanisms for the natal kicks have been suggested. The majority of the proposed theories down to date is based on some physical or dynamics factor with some asymmetry on space direction on the very short time scale (100 ms–10 s) during supernova explosion (birth of pulsar or neutron star). These theories in itself have certain kind difficult or special requirement such as, a) the strength of magnetic field is as high as 10^{15}–10^{16} Gauss or b) the initial asymmetry is too much for supernova explosion. The acceleration of the neutron stars may be got by recoil of electromagnetic radiation in less than one year after the pulsars were born according to the fourth model. But the fourth model is hard to be physical, because it's precondition is that the gravitational radiation role would be suppressed.

On the basis of the neutrino emission from the isotropic $^1S_0$ neutron superfluid vortexes in the neutron star interior (Peng, Haung and Huang 1982, A&A, 107, 258), we propose a rocket model of neutrino jet for pulsar kick. It is shown not only naturally the gradual acceleration of the nascent pulsars is naturally shown in the time scale that the period of the pulsar increases from P_0 to $10P_0$ (about 200–300 years), but also can get very nicely the huge natal kicks of neutron stars exceed 1000 km/s. We have contributed acceleration scenario of pulsars with different initial period and with different magnetic field. The results of the paper are as follows: a) The observed alignment of the pulsar kicks with their spinning axes may be interpreted. b) The initial periods of pulsar with velocity greater than 100 km/s are shorter than (2–3) ms, and the initial periods of pulsar with velocity greater than 1000 km/s are shorter than 0.8 ms. c) The shorter the initial period of pulsars is, the faster the pulsar velocities is, if the magnetic fields of the pulsars are the same. d) The stronger the magnetic field of the pulsar is, the faster the pulsar velocity is, if the initial period of the pulsars is the same. e) For two pulsars with same velocity, the initial period of the pulsar with stronger magnetic field is shorter than one of another pulsar with weaker magnetic field.

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