2014年第3回物理談話会のお知らせ

タイトル：**新種の謎の変動天体、Fast Radio Burst は連星中性子星の合体か？**

講師　：　**戸谷 友則　氏**　**(東京大学理学部教授)**

場所　：　~~４号４３４０教室＝＞~~**１０号館Ｘ１０２**

日時　：　~~2014年10/6（月）　17:15-18:15~~　＝＞10 月 10 日　17:15-18:15

講演概要

昨年、継続時間がわずか数ミリ秒で電波で輝く突発天体、Fast Radio Burst(FRB) が発見された。dispersion measure から、z ~ 1 程度の宇宙論的な遠方で発生している天体と考えられている。その起源はまだ全くの謎であるが、私は連星中性子星の合体が最も自然な説明を与えると考えている。本講演では、FRB について紹介し、現在までに提案されている諸説も議論しながら、その起源について考えたい。時間が余れば別の話題として、昨年に発生した z = 5.913 のガンマ線バースト GRB 130606A から得られた宇宙再電離への示唆について簡単に紹介したい。

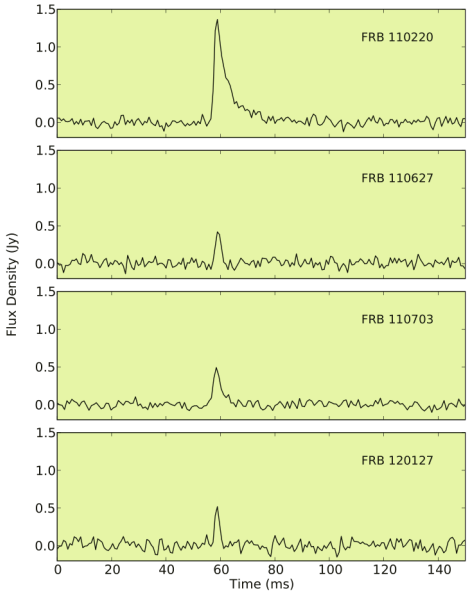

Fig. 1. The frequency-integrated flux densities for the four FRBs. The time resolutions match the level of dispersive smearing in the central frequency channel (0.8, 0.6, 0.9, and 0.5 ms, respectively).

Thornton, D. et al. 2013, Science, 341,53

Cosmological Fast Radio Bursts from Binary Neutron Star Mergers

Tomonori TOTANI
Department of Astronomy, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033
Research Center for the Early Universe, School of Science, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033

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Abstract

Fast radio bursts (FRBs) at cosmological distances have recently been discovered, whose duration is about milliseconds. We argue that the observed short duration is difficult to explain by giant flares of soft gamma-ray repeaters, though their event rate and energetics are consistent with FRBs. Here, we discuss binary neutron star (NS–NS) mergers as a possible origin of FRBs. The FRB rate is within the plausible range of the NS–NS merger rate and its cosmological evolution, while a large fraction of the NS–NS mergers must produce observable FRBs. A likely radiation mechanism is coherent radio emission, like radio pulsars, by magnetic braking when magnetic fields of neutron stars are synchronized to binary rotation at the time of coalescence. Magnetic fields of the standard strength ($\sim 10^{12-13}$ G) can explain the observed FRB fluxes, if the conversion efficiency from magnetic braking energy loss to radio emission is similar to that of isolated radio pulsars. Corresponding gamma-ray emission is difficult to detect by current or past gamma-ray burst satellites. Since FRBs tell us the exact time of mergers, a correlated search would significantly improve the effective sensitivity of gravitational wave detectors.

Key words: gravitational waves — radio continuum: general — stars: binaries: general — stars: neutron

Totani, T. 2013, PASJ, 65, L12