

Exploration of Cosmic Neutrino Background

◆ Few seconds after Big Bang → Cosmic Neutrino Background (CvB)

300,000 years after BB → Cosmic Microwave Background (CMB)

◆ Discovery of CvB means the first direct observation of the cosmic era before CMB, => clarification of the initial condition for the formation of galaxies and large-scale structures of the Universe.

◆ A large amount of CvB of about $100/\text{cm}^3$ is expected.

This enables us a high precision observation of the neutrino decay, and thus provides us with the only way to directly measure the absolute value of neutrino masses, which play an essential role in the development of cosmic fluctuations together with the effects of dark matter and dark energy.

★ Exploration of CvB by rocket and satellite experiments

Precision measurements of far IR photons from neutrino decays.

◆ **Step 1: Rocket experiment**: take data for 5 min. at 200 km high.

Determine the life of the neutrino if it is shorter than 10^{14} years. (cf. current lower bound = 3×10^{12} years.)

◆ **Step 2: Satellite experiment**

Determine the life of the neutrino if it is shorter than 10^{17} years.

◆ **Development of SOI-STJ detectors.**

Operation at extreme low temperatures confirmed. (Nagata et al., 2009).

