

Oto Cosmo Observatory

K.Takahisa, S.Ano, K.Fushimi**, T.Kishimoto*, K.Matsuoka*, Y.Nagai, I.Ogawa*,
S.Umehara* and S.Yoshida

Research Center for Nuclear Physics, Osaka University

**Department of Physics, Osaka University, Toyonaka, Osaka, Japan*

***Faculty of General Science, Tokushima University, Tokushima, Japan*

"Oto Cosmo Observatory[1], RCNP, Osaka University" has been constructed in the center of the tunnel which location is about 100 km south from Osaka University for ultra rare process nuclear spectroscopy in 1997. It has been constructed in Tentsuji Tunnel with 5 km length between Oto village and Nishiyoshino village in Nara prefecture. The schematic view of "Oto Cosmo Observatory" is shown in Fig.1. The maximum depth of the tunnel is about 500 m (1400 m w.e.). It has a low background environmental condition with $1 \times 10^{-7} \text{ cm}^2 \text{ sec}^{-1}$ for cosmic ray flux[2], and about 10 Bq/m³ for radon concentration in the air. The total number of person who enter in Oto Cosmo Observatory are 259 in this year (Fig.2).

The experimental room with area of 6m \times 3m that is located at the 3 km from Oto entrance, is used for ELEGANT V [3] from April in 1997. The detector system ELEGANT V has been designed for study of ultra rare process nuclear spectroscopies. ELEGANT V consists of 16 NaI scintillators. The large volumes (0.76 tons) NaI in ELEGANT V are used for study of Dark Matter(DM) problem. In this year, the new low background NaI(Tl) scintillators are installed.

Another room with the area of 3.5m \times 3m is used for the ELEGANT VI [4] from November in 1997. The new detector system ELEGANT VI has been designed for study of WIMPs DM candidates. ELEGANT VI consists of 25 CaF₂ scintillators surrounded by 20 CsI scintillators. ¹⁹F has large spin matrix element and large mass fraction in CaF₂. The ⁴⁸Ca contained in the CaF₂ are used for measurement of $\beta\beta$ decays.

Third experimental room with the area of 3.5m \times 3m is used for the multipurpose room from January in 1999. The third experimental rooms were constructed by modification of the shelters. The R&D of segmented and low background NaI(Tl) detector for DM search has started by Tokushima Univ. group[5]. SONY company group are studying the root causes of SER(soft error rate) of semiconductor device from December in 2000.

The safety of tunnel was checked by TOKO company around the first and third experimental room (300m).

References

- [1] K.Takahisa *et al.*, RCNP Annual Report 2000 p92-93
- [2] H.Kuramoto, Master thesis (Osaka Univ.) 1999
- [3] H.Ejiri *et al.*, Phys.Rev.C63(2001)065501-1-7
- [4] I.Ogawa *et al.*, Nucl.Phys.A663c-664c(2000)869-872
- [5] S.Umehara *et al.*, RCNP Annual Report 1999 p105-106

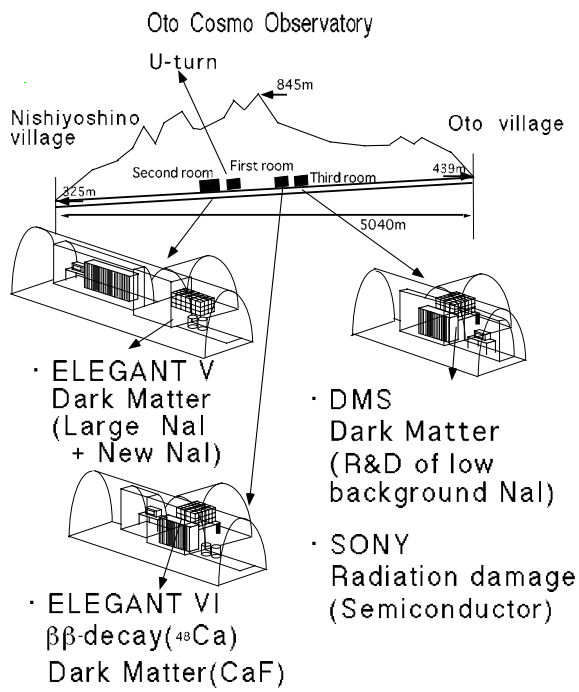


Figure 1: The schematic view of the experimental rooms

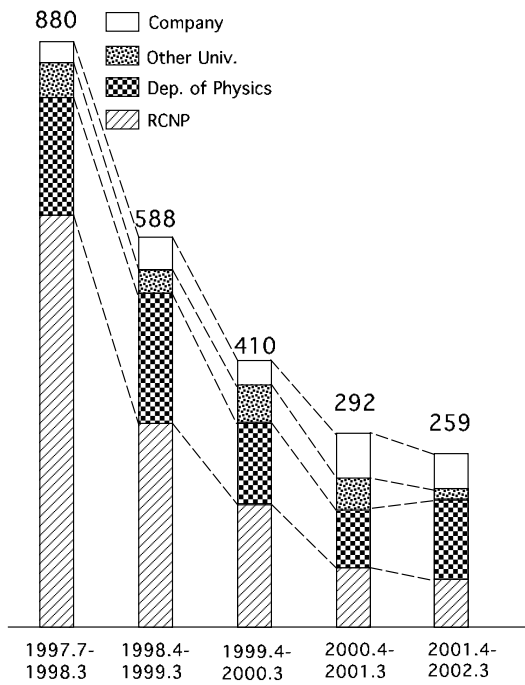


Figure 2: The total number of person who enter in Oto Cosmo Observatory