

Oto Cosmo Observatory

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”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 292 in this year (Fig.2.).

The experimental room with area of 6m × 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.

Another room with the area of 3.5m × 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 × 3m is used for the ELEGANT VII[5,6] from January in 1999. The third experimental rooms were constructed by modification of the shelters. The new detector system ELEGANT VII has been designed for study of double beta plus decay process. ELEGANT VII consists of 9 NaI(Tl) scintillators. The R&D of segmented and low background NaI(Tl) detector for DM search has started by Tokushima Univ. group[7]. SONY-company group were searched about radiation damage of some semiconductors.

References

- [1] K.Takahisa *et al.*, RCNP Annual Report 1999 p101-102
- [2] H.Kuramoto, Master thesis (Osaka Univ.) 1999
- [3] N.Kudomi *et al.*, Nucl.Phys.A629,527c(1998)
- [4] I.Ogawa *et al.*, RCNP Annual Report 1999 p34-35
- [5] Y.Tujimoto *et al.*, RCNP Annual Report 1999 p36-37
- [6] K.Takahisa *et al.*, RCNP Annual Report 1999 p103-104
- [7] S.Umehara *et al.*, RCNP Annual Report 1999 p105-106

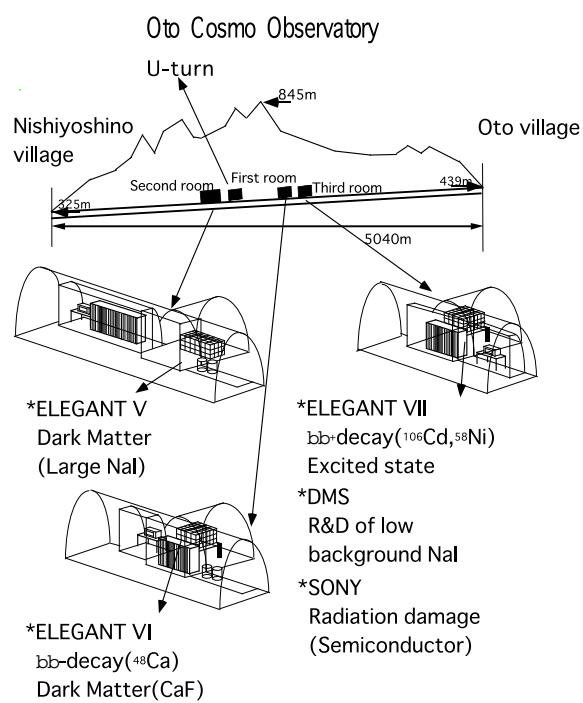


Figure 1: The schematic view of the experimental rooms

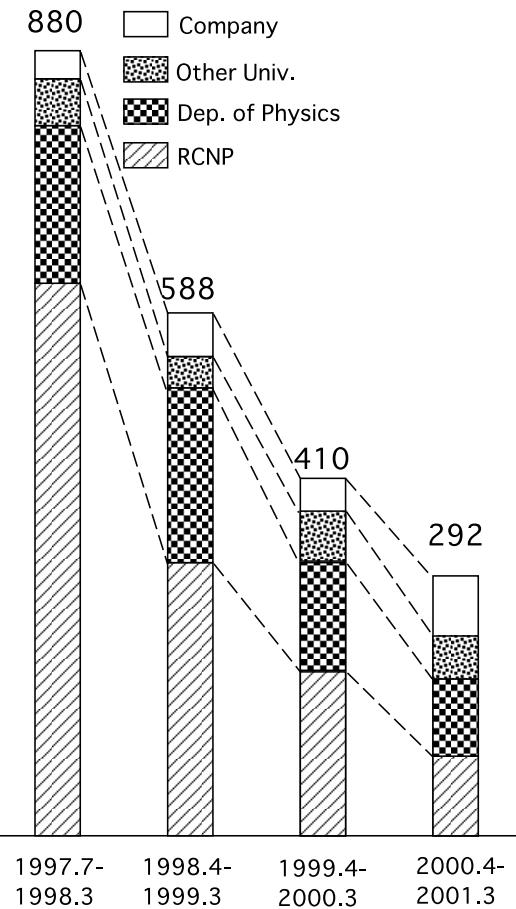


Figure 2: The total number of person who enter in Oto Cosmo Observatory