

# **Search for Cosmic-ray Antiparticle of Cosmic Origin in Solar Minimum Period by using a Superconducting Magnetic Spectrometer**

**Akira Yamamoto**

(High Energy Accelerator Research Organization, Cryogenics Science Center, Professor)

## **【 Outline of survey 】**

We aim at to investigate elementary particle phenomena in early universe, through

- precise measurement of cosmic-ray antiproton flux, and
- search for cosmic-ray antiparticle and antimatter of cosmic origin such as primordial black holes, and dark matter in the universe.

We also investigate matter/antimatter asymmetry in the universe, through direct search for cosmic-ray antiparticle and/or antimatter.

A superconducting magnetic spectrometer named, BESS-Polar, has been developed with previous research grant awarded by MEXT for a long duration balloon flight over Antarctica. We are planning to realize the cosmic-ray observation over Antarctica, in solar minimum period, 2007, by using the spectrometer being upgraded.

## **【 Expected results 】**

We expect very precise measurement of cosmic ray flux, and highly sensitive search for antiparticle/antimatter of cosmic origin, during a long duration flight of 20 days around the south pole over Antarctica. It will give us very important information on "primordial black holes" predicted by S. Hawking, and on fundamental cosmic-ray physics.

## **【 References by the principal researcher 】**

- A. Yamamoto et al., "BESS and its future prospect for polar long duration flight", Adv. Space Res.31 No. 5, (2002) pp. 1253- 1262.
- A. Yamamoto et al, "A thin superconducting magnet for particle astrophysics", IEEE Trans. Appl. Superc. 12 No. 1 (2002) pp.438-441.
- A. Yamamoto et al., "Latest result from BESS and future prospects", "Frontier of Cosmic Ray Science", vol. 8, Univ. Acad. Press,(2004) 347-360.

**【 Term of project 】 FY2006 - 2009**

**【 Budget allocation 】 33,600,000 yen**

**【 Homepage address 】**

<http://bess.kek.jp/>