

Study of Higgs Particle and Search for New Particles

- ◆ 10⁻¹⁰ sec after Big Bang: Higgs phase transition, particles get masses.
- ◆ Clarification of the nature of the Higgs particle(s): the number of Higgs particles, decay to dark matter particles, self-coupling

=> **Origin of mass, direct search for the dark matter**

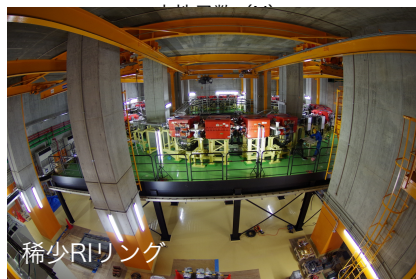
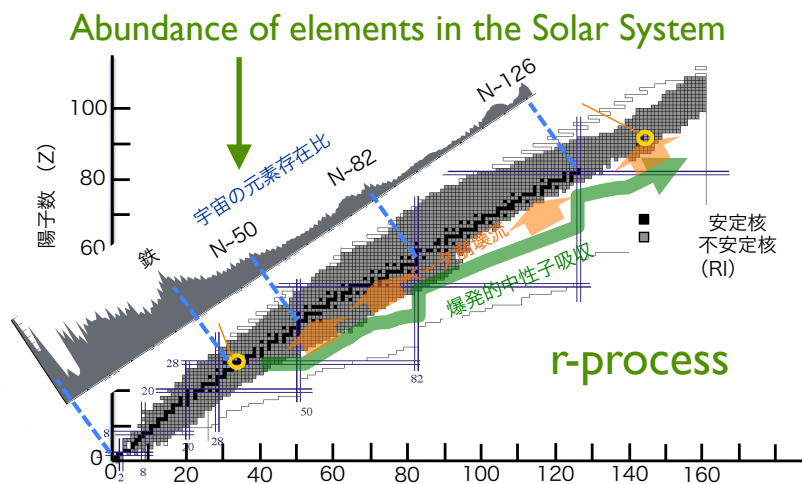
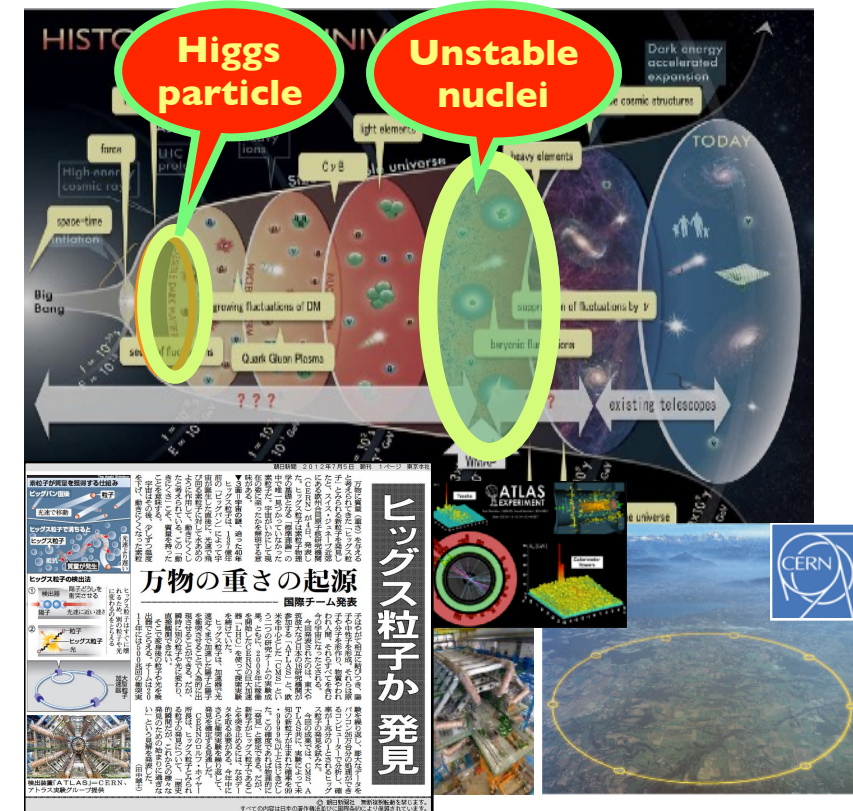
towards physics beyond the standard model, critical test of the principles of particle physics (gauge symmetry, renormalizability).

- ◆ Exploration of super-symmetric particles, extra dimensions, etc.

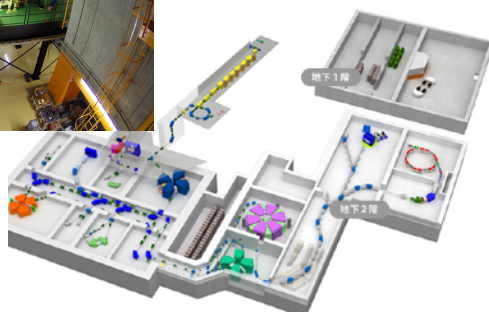
=> **Origin of force, origin of space-time**

★ **ATLAS experiment at CERN/LHC**

Development of high-resolution detectors by the silicon micro strip sensor.



RIKEN/RIBF



Study of Unstable Nuclei

- ◆ **Origin of heavy elements in the Universe:**

Super-nova explosions after the formation of first stars and galaxies around 13 Bi. years ago, merger of neutron stars, etc.

Important to understand the reaction processes of unstable nuclei (r-process, s-process).

★ **Study of unstable nuclei using heavy-ion accelerators**

Measure masses and lifetimes of unstable nuclei by Rare RI-Ring at the RI Beam Factory (RIBF) of RIKEN, and obtain the reaction rates for the r-process.

1st step: Study the reason for the peak at $N \approx 50$;

2nd step: $N \approx 82$; 3rd step: $N \approx 126$