



# Strangeness in Nuclear Physics: an overview of recent achievements, open problems and future perspectives

**Prof. HIROKAZU TAMURA**

SALA WATAGHIN, Physics Dept. - 2017, 10th November 4 p.m.

Strangeness sheds a new light on nuclear physics to approach essential problems such as the origin of nuclear (baryon-baryon) force, the nature of high-density nuclear (baryonic) matter, and the properties of nucleons (baryons) inside nuclei.

Through many experiments at BNL, KEK, DAΦNE, Jlab, J-PARC, GSI, MAMI, etc., our understanding of hypernuclear structure and underlying hyperon-nucleon / hyperon-hyperon interactions have been deepened. Among them, recent important results will be shown on the first observation of  $\Lambda$  hypernuclei and confirmation of a large charge symmetry breaking effect in  $\Lambda$  hypernuclei.

In spite of experimental and theoretical efforts, there remain several open problems. In particular, the "hyperon puzzle" in neutron stars is one of the most serious and important problems in nuclear and hadron physics. We are planning to approach it via high precision spectroscopy of  $\Lambda$  hypernuclei at J-PARC and Jlab. In addition, new experiments to investigate the magnetic moment as well as the weak decay properties of a  $\Lambda$  hyperon in hypernuclei will clarify possible modification of nucleon (baryon) in nuclear medium. For these purposes we are also elaborating on upgrade plans of J-PARC facilities.