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Strangeness Nuclear Physics at the J-PARC era

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Strangeness degrees of freedom do not show up prominently in the standard nuclear physics at low energies. However, by explicitly implanting the strangeness in a nucleus, we can extend our scope of hadron many-body systems into the flavor SU(3) world and create new types of hadronic systems. In many cases, the extensions are not so trivial, and we need to reconsider our basic understandings of hadron physics which have been effective in the ordinary nuclear physics. After the shutdown of BNL-AGS and KEK-PS in US and Japan for strangeness nuclear physics, experimental researches have been conducted at Jefferson Laboratory in US, and LNF in Italy in the last several years, and are now about to start at GSI and Mainz in Germany. Recent topics are summarized in this talk. In Japan, construction of a high-intensity accelerator complex, Japan Proton Accelerator Research Complex (J-PARC), is completed. Beam commissioning of the slow-extraction beam from the J-PARC main proton synchrotron started from January, 2009. The beam was successfully extracted and transported to the Hadron Experimental Hall on January 27. The first secondary-beam production was confirmed on February 11 at the K1.8-branch beam line in the hall. Although we need a lot of work to be completed before the beam would be available for experimental users, we believe this is the start of the J-PARC era to open new research fields in strangeness nuclear physics. The K^- beams with the highest intensity in the world enable us to carry out various interesting experimental subjects; the (K^-,K^+) missing-mass spectroscopy to discover Ξ hypernuclei, hypernuclear gamma-ray spectroscopy, search for kaonic nuclei, and so on. New detector systems such as the SKS+ spectrometer, Hyperball-J detector, and Cylindrical Detector System (CDS) are now in preparation. Present status of the experiments, our initial physics goals at J-PARC and the perspectives are discussed.