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Physics probed by precise neutrino oscillation measurements at Hyper-Kamiokande

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Abstract: Neutrino oscillation discovered in 1998 through the observation of atmospheric neutrinos by the Super-Kamiokande experiment implies that neutrinos have non-zero masses, which was the first evidence of physics beyond the standard model of elementary particles where neutrinos are massless. Since then, thanks to many neutrino experiments based on solar, atmospheric, accelerator and reactor neutrinos, already completed or still ongoing, our knowledge on neutrino properties, in particular, their masses and mixing, has been significantly improved. We are now in the precision era of neutrino physics. In this presentation, after the short introduction, firstly I will describe briefly the current status or what we have learned so far, focusing mainly on neutrino mass and mixing parameters relevant for oscillation phenomenon including CP phase. Secondly I will address what are the open questions in neutrino physics yet to be answered. Then I will discuss, from phenomenological point of view, what improvement on our knowledge for neutrinos can be achieved by Hyper-Kamiokande (HK) project mainly considering its long-baseline neutrino oscillation program, one of the most important objectives of HK. I also would like to discuss briefly possible synergy/complementarity between HK and other experiments such as JUNO and DUNE.

Lecturer: He obtained the doctor of science degree in physics at Tokyo Metropolitan University in 1992, followed by postdoctoral positions during 1993-1995 at High Energy Research Organization (KEK) in Japan, during 1996-1997 at University of Valencia in Spain, and during 1998-2000 at Universidade Estadual de Campina (UNICAMP) in Brazil. During 2001-2003, he worked as a collaborating professor at Instituto de Física Teórica (IFT) of Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP) in Brazil. He joined the department of physics of Pontifícia Universidade Católica do Rio de Janeiro in August of 2003. His research interest is physics and astrophysics of neutrino. He is chair of the Physics Department of PUC-Rio since December 2022 (From Lattes CV).

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