武汉物数所理论交叉学术交流系列报告

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Relativistic Many-body Theories to Probe New Physics due to Parity and Time-reversal Symmetries Violating Interactions

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磁共振楼10楼1016-17报告厅

About the speaker:

Prof. Sahoo got his PhD at Indian institute of Astrophysics in 2006.He was the guest scientist at GSI Germany, Post-Doc at Max-Planck Institute for the Physics of Complex Systems, Germany, Post-Doc and Project Leader at KVI,Netherland.The Awards and honors he got include ***Young international Scientists Fellowship award*** (2010) from the Chinese Academy of Sciences, and ***the CAS President's International Fellowship Initiative (PIFI)*** for 2017. His research focuses on the high precision atomic many-body theory.He has over 100 publications in peer reviewed journals.

Abstract:

Unlike molecules, it is generally assumed that atoms cannot have permanent electric dipole moments (EDMs) as they are the non-degenerate systems in the relativistic theory. However, under the simultaneous violations of parity (P) and time-reversal (T) symmetries atoms can have permanent EDMs. On the other hand, T-violation means CP violation as per the CPT theorem of particle physics. One of the criteria to explain the matter-antimatter asymmetry of our Universe is to find out enough CP violation sources than described by the standard model (SM) of particle physics. Physics explaining other possible kinds of CP violations suggest for large EDMs in atomic systems. Some of the ongoing laboratory experiments indicate large EDMs in atoms, which can arise due to EDMs of electrons and quarks or because of CP-odd interactions between the electrons and quarks. To infer these CP-odd parameters from the atomic measurements, it is imperative to carry out calculations employing relativistic atomic many-body methods by incorporating both the electromagnetic (parity even) and CP violating (parity odd) interactions simultaneously. The present talk will highlight the roles of relativistic many-body methods to infer various CP violating fundamental quantities from the atomic EDM measurements; particularly, from the 199Hg atom. Results obtained from the combined atomic theory and experiment will be compared with the SM values to search for plausible new physics.

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