



## Physics Colloquium

# Spin chains on metallic surfaces: model systems for heavy fermion quantum criticality



November 19, 2025 (Wednesday)



4:30 p.m.



MW103, 1/F, Meng Wah Complex,  
Main Campus, HKU



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### Abstract:

Cobalt adatoms on metallic surfaces can be described by a simple model: a spin  $3/2$  Heisenberg chain with single ion anisotropy, coupled antiferromagnetically to the two dimensional conduction electrons. On the basis of numerical simulations and scaling arguments we will show that this simple system allows us to explore a wealth of quantum phenomena—including the breakdown of quasiparticles, dissipation-induced quantum phase transitions, topological phases with protected edge modes, and Kondo-screened heavy Fermi liquid phases.

### Biography:

Professor Assaad received his PhD in Physics at the ETH Zürich in 1991. He worked as postdoctoral fellow at University of Würzburg from 1991-1993, University of Tokyo from 1994-1995, University of California, and Santa-Barbara at 1996-1997. He started his assistant position at the university of Stuttgart in 1997 and worked as Heisenberg fellow from 2001-2003. He then worked as professor (C3) at the University of Würzburg from 2003. In 2009, he became co-spokesman of the research unit FOR1162, Electron induced phenomena in surfaces and interfaces with tunable interactions and spokesman of the research unit FOR1807, Advanced Computational Methods for Strongly Correlated Quantum Systems, in 2011. His project proposal for computational resources was awarded the John von Neumann Exzellenz-Projekt 2012 prize. His research interest includes: computational quantum many body physics, strongly correlated electron systems, and development and investigation of numerical tools.