IQ ST | INTEGRATED QUANTUM SCIENCE AND TECHNOLOGY

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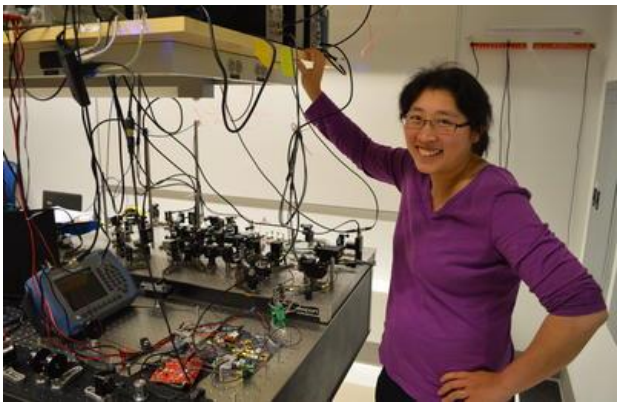
Invitation to IQST Seminar

on Friday, September 6, 2019, 9am
University of Stuttgart
Seminar room 3.123, Pfaffenwaldring 57 (NWZ II)



Kang-Kuen Ni

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Direct observation of ultracold bimolecular reactions

Recent tools developed for cooling atoms and molecules allow certain classes of molecules to be prepared below milli-Kelvin temperature. Such advances open the opportunity to explore chemistry in this low temperature regime. In particular, the bi-alkali molecules have been the coldest (below one micro-Kelvin) and their collisions and reactions were studied extensively by precise quantum state preparation of the reactants followed by monitoring their loss. Those loss rates reveal rich information about the long-range physics that determines how the reactants approach each other, including the role of quantum statistics. However, those experiments so far lacked the capability of direct detection of products, a key requirement to study chemical reactions in detail. We combine ionization detection and ion velocity map imaging within a quantum gas apparatus to study reactions of KRb+KRb. These new tools allow us to directly detect all relevant species in the intriguing 4-center reaction KRb + KRb -> K2Rb2* -> K2+Rb2, including the surprising detection of the intermediate complex.

Reference: M.-G. Hu, Y. Liu, D. D. Grimes, Y.-W. Lin, A. H. Gheorghe, R. Vexiau, N. Boulufa-Maafa, O. Dulieu, and K.-K. Ni. arXiv.1907.13628 (2019)

Host: Prof. Dr. Tilman Pfau, 5. Physikalisches Institut, Universität Stuttgart