Workshop on Cold Rydberg Chemistry



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## Synthetic dimension-induced conical intersections in Rydberg molecules

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We observe a series of conical intersections in the potential energy curves governing the collision between a Rydberg atom and a ground-state atom [1]. This apparent contradiction of the von Neumann-Wigner theorem is resolved by employing the energy of the Rydberg electron as a synthetic dimension. One observable consequence of the conical intersections arises in the *l*-changing collision rate of the process Rb(nf)+Rb(5s) $\rightarrow$ Rb(nl > 3)+Rb(5s). In the vicinity of a conical intersection, this rate is strongly suppressed. We expect conical intersections and other beyond Born-Oppenheimer effects to play an important role in the dynamics of Rydberg-neutral collisions and Rydberg molecules.

[1] F. Hummel, M. T. Eiles, and P. Schmelcher Phys. Rev. Lett. 127, 023003 (2021)

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