

Collisions of reactive molecules: from ultracold domain to classical limit

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Abstract

Quantum degenerate molecular gases have already been realized in recent experiments [1, 2]. Understanding the behaviour of such systems is impossible without the knowledge about two body collisions. We thus investigate collisions of reactive particles interacting through the van der Waals potential at finite temperatures. Due to finite collision energy, many partial waves have to be taken into account. Using quantum defect approach [3], we obtain estimates for elastic and reactive rate constants. We find the agreement with the ultracold (s-wave) limit [4], as well as with the classical Langevin limit. We discuss the role of shape resonances, which may increase the loss rates significantly, which can be seen even at considerably high temperature.

References

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