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Interference of Feshbach and zero-energy resonances in ultracold chemical reactions SUBHAS GHOSAL, IONEL SIMBOTIN, ROBIN CÔTÉ, University of Connecticut — We present results of quantum mechanical scattering calculations to determine the behavior of reactive scattering at ultracold temperatures. The presence of a virtual state or a bound state associated with the van der Waals well in the entrance channel can enhance the zero temperature rate coefficient for reactive systems with a barrier. Particularly, if the virtual or bound state is very close to the threshold and form zero kinetic energy resonance, the reaction rate can be enhanced by many orders of magnitude. Feshbach resonances associated with the bound or quasi-bound states of the van der Waals well in the product arrangement can also increase or decrease the final outcome of the result. We have explored this by examining two chemical reactions in the ultracold temperature limit; $F + H_2 \rightarrow FH + H$ and $D + H_2 \rightarrow DH + H$. The position of the virtual or bound states is shifted by changing the reduced mass of the system. This can also be achieved with an external electric field.

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