

Absorption of negatively charged pions by superfluid helium

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Abstract

We calculate quenching cross-section of a pionic helium atom colliding with helium atoms at a superfluid helium temperature and density. We find that quenching is unlikely to be significant for metastable pionic atom states with principal quantum number $n < 19$. However populations of less shielded states with $n \geq 19$ are strongly quenched by collisions due to nuclear absorption. This result may be helpful in the interpretation of experimental data from recent laser spectroscopy measurements of pionic helium atoms [1, 2, 3], aiming to determine the pion mass with high precision.

References

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