Abstract Submitted
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Low energy neutron deuteron scattering to N^{3}LO[1] ARMAN MARGARYAN, JARED VANASSE, ROXANNE SPRINGER, Duke University — We calculate the next-to-next-to-next-to-leading order (N^{3}LO) *nd* scattering amplitude in the framework of nonrelativistic pionless effective field theory (EFT$_{\not\pi}$). This theory is only valid when the typical momentum exchange in the scattering is smaller then the mass of the pion. The power counting parameter for EFT$_{\not\pi}$ is the ratio $\frac{Q}{\Lambda_{\not\pi}}$, where Q is the typical momentum exchange in the scattering and $\Lambda_{\not\pi}$ is the EFT$_{\not\pi}$ breakdown scale, $\Lambda_{\not\pi} < m_\pi$. The calculation of the amplitude for *nd* scattering at leading order requires summing an infinite set of diagrams. The first nonzero polarization-dependent observables occur at N^{2}LO. At N^{3}LO new 2-body forces appear, which introduce four new EFT$_{\not\pi}$ coefficients. These coefficients are fixed by the ^3P_J and $^1P_1$ phase shifts of NN scattering. We find that these terms have an important impact. The results of this calculation at N^{3}LO will be important for understanding spin polarization observables in *nd* scattering, in particular the longstanding A_y puzzle.

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