

Indication of pionic-atom anomalies in pion-nucleus elastic scattering

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Elastic cross sections for the scattering of positive and negative pions from ^{58}Ni were measured at 30 MeV incident pion energy. Statistical errors of $\pm 3\%$ and normalization errors of $\pm 6\%$ were achieved. These data appear to confirm the theoretical construct that the physics which explains anomalously small shifts and widths in pionic atoms would be manifested in low energy pion-nucleus elastic scattering. The data show good agreement with the cross sections calculated assuming s and p partial waves are anomalous. Here anomalous refers to partial waves that are calculated from an optical potential which reproduces anomalously small level shifts and widths in pionic atoms. Conventional optical potentials do not agree as well with both the π^+ and π^- data. Various conventional possibilities such as a larger neutron radius than proton radius in the nuclear density were tried, but these did not result in good agreement with the data.