

P24 Precision Spectroscopy of Antiprotonic Atoms for Investigation of Low-energy Antinucleon–nucleus Interactions

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- Antiprotonic atom X-rays: reflect strong-interaction level shifts and broadening
 - Reflects antiproton-nucleus scattering length & nucleon distribution

$$2\mu V_{\text{opt}}(r) = -4\pi \left(1 + \frac{\mu}{M} \frac{A-1}{A} \right) \left[\overset{\text{Isoscalar}}{\boxed{b_0(\rho_n(r) + \rho_p(r))}} + \overset{\text{Isovector}}{\boxed{b_1(\rho_n(r) - \rho_p(r))}} \right].$$

$\rho_n(r), \rho_p(r)$: neutron/proton density distribution

→ aim: determine the isovector term (pbar scattering length → nbar scattering length)

- Use superconducting microcalorimeter transition-edge sensor (TES)
 - First pbar-atom X-ray detected (May 2025)
 - More challenges to overcome

