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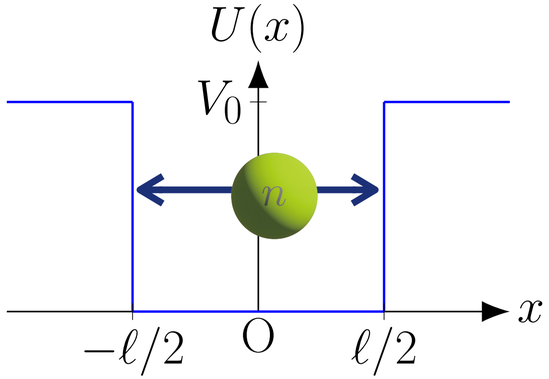
A plan for antineutron-nucleus scattering experiments toward neutron-antineutron oscillation searches

neutron–antineutron oscillation

search using ultracold neutrons in a storage bottle



pseudopotential for neutrons U_n

pseudopotential for antineutrons $U_{\bar{n}}$

should satisfy

$\mathrm{Re}\, U_n \approx \mathrm{Re}\, U_{\bar{n}}$ and a small $\mathrm{Im}\, U_{\bar{n}}$

to maximize the experimental sensitivity

However ….

$U_{\bar{n}}$ has not been evaluated directly

$$U_{\bar{n}} = \frac{2\pi\hbar^2}{m} N \frac{A+1}{A} a_{\bar{n}A}$$

We propose to determine the scattering length $a_{\bar{n}A}$ by antineutron-nucleus scattering experiments

low-energy antineutrons to be produced with the $p\bar{p} \to n\bar{n}$ reaction at CERN-AD