

## $\phi$ - $N$ Interaction via $\pi^- p \rightarrow \phi n$ at J-PARC P95

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Recently, there has been active research on how the properties of the  $\phi$  meson change in nuclear matter. Understanding the  $\phi$ -nucleon interaction is essential for clarifying the behavior of the  $\phi$  meson in a nuclear environment. Also, the  $\phi$ - $N$  interaction is a unique hadronic system where quark exchange is forbidden at the first order, making gluon exchange the dominant mechanism. While  $\phi$  photoproduction experiments suggest a weak  $\phi$ - $N$  interaction, correlation function analyses from  $pp$  scattering and lattice QCD calculations indicate a possible strong attraction. These conflicting results leave the strength of the interaction uncertain.

To address this, we propose the J-PARC P95 experiment to measure the cross-section of  $\pi^- p \rightarrow \phi n$ . This reaction provides direct access to the  $s$ -channel  $\phi$ - $N$  interaction, allowing us to investigate nucleon resonances and the potential existence of hidden-strangeness pentaquark states. In this talk, we will discuss the experimental approach and its implications for understanding hadron interactions.

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