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What is the trend for the SO-splitting? Approaching the island of inversion using ^{32}Si$(d,p)^{33}$Si and ^{33}P$(d,p)^{34}$P reactions JIE CHEN, DANIEL BAZIN, National Superconducting Cyclotron Laboratory, MSU — The Spin-orbital (SO) interaction plays a very important role in determining the magic numbers but is poorly constrained so far. We propose to study low-lying $l = 1/l = 3$ single-particle states to access the SO-splitting in ^{33}Si and ^{34}P using one neutron-adding transfer reactions. The SOLARIS magnet solenoid coupled with the HELIOS silicon array will be used to detect the protons. The goals of the experiment are to determine the $l = 1$ and $l = 3$ single-particle energies and SO-splitting in ^{33}Si and ^{34}P and compare with nuclei in the same isotonic chains. Special attention will be paid to determining the excitation energies of the $1/2^-$ and $5/2^-$ states in ^{33}Si, which play an important role in determining the trend of the p-wave and f-wave SO-splitting. This information will determine if there is a sudden change of the SO-splitting in silicon isotopes, which links to the nucleus bubble effect, weak-binding effect, the SO interaction and the underlying mechanisms driving its evolution.

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