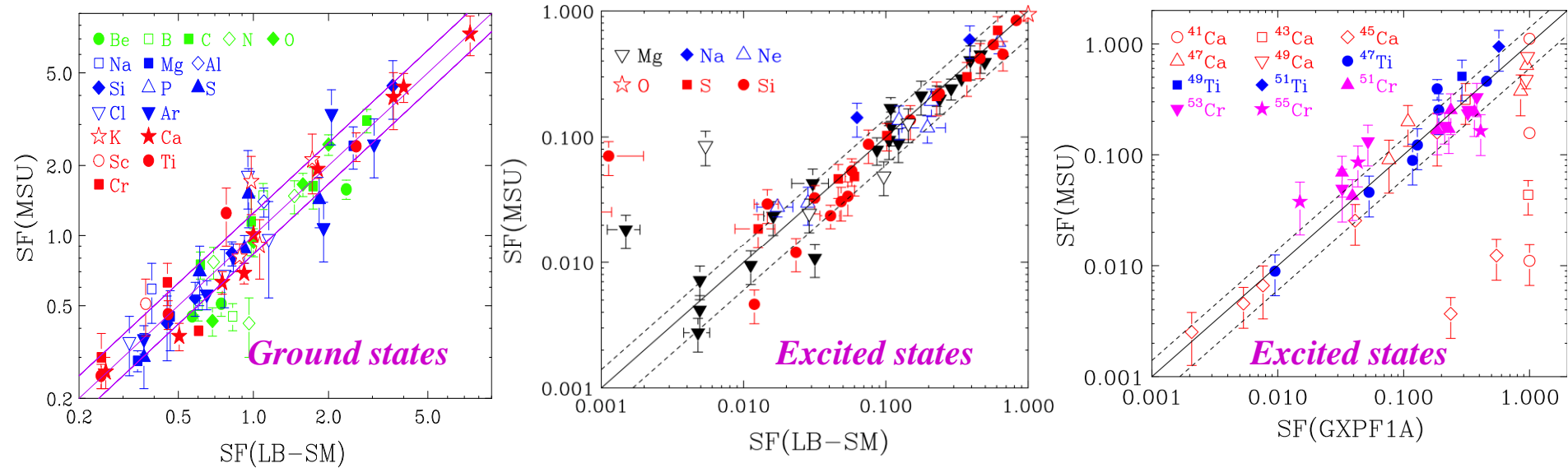


Spectroscopic factors of $Z < 28$ nuclei



Modern Shell Model plus reaction theory predict the cross-sections of single nucleon transfer reactions to 20-40% for $Z < 28$ nuclei

This study evaluated and reanalyzed all of the available (p,d) and (d,p) cross section data. Except for very small spectroscopic factors and a few states near ^{40}Ca with wave functions outside the theoretical model space, the agreement between data and large basis shell model calculations is better than 40% and typically about 25%.

Many spectroscopic factors needed for astrophysical nucleo-synthesis calculations are too difficult to measure and must be calculated. These studies establish regions where shell model calculations are reliable and where improvements are needed.

Deficiencies in the current theoretical description of Ni isotopes were indentified that can impact current attempts to predict the structure of medium mass r-process nuclei in the vicinity of ^{78}Ni .