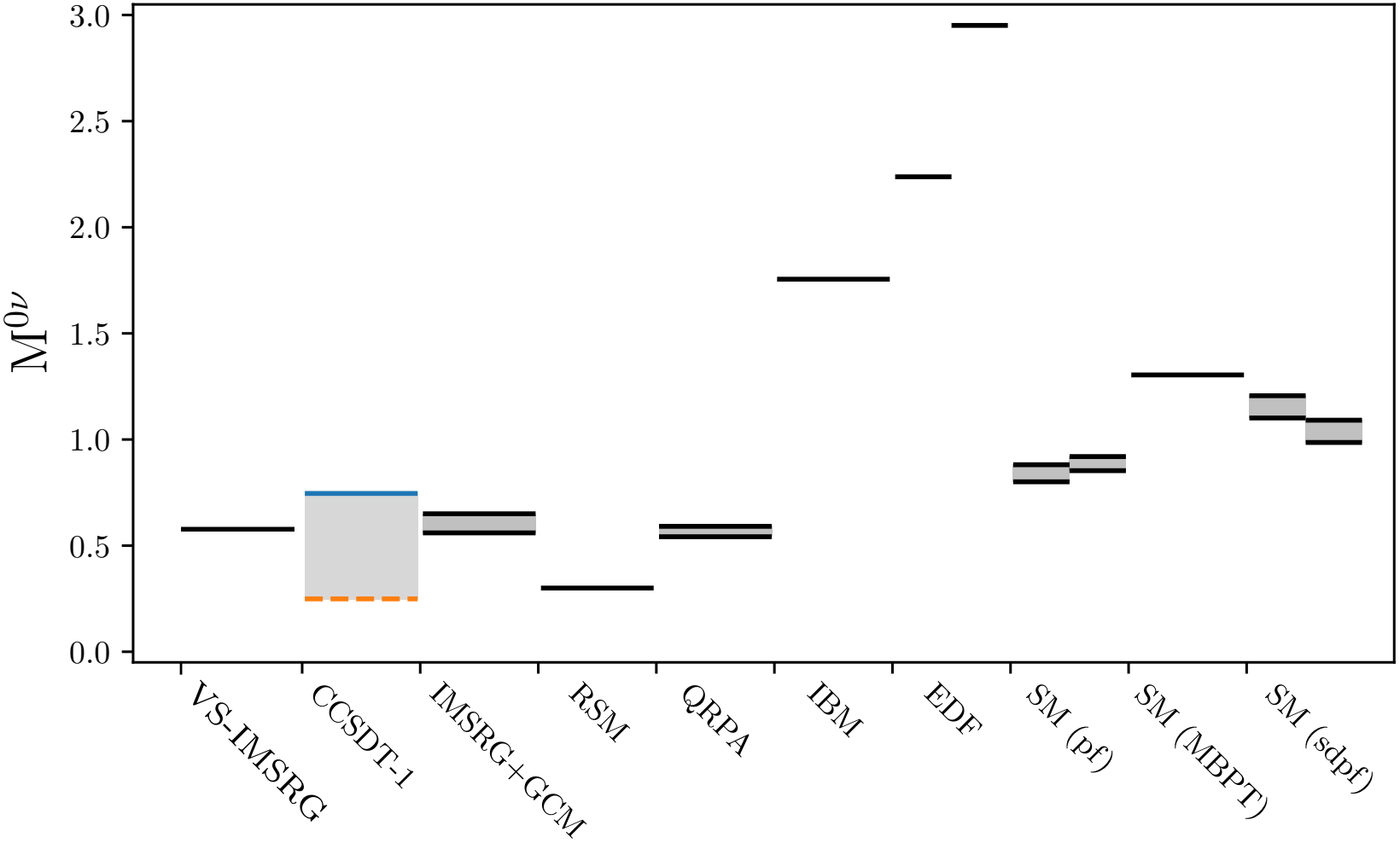
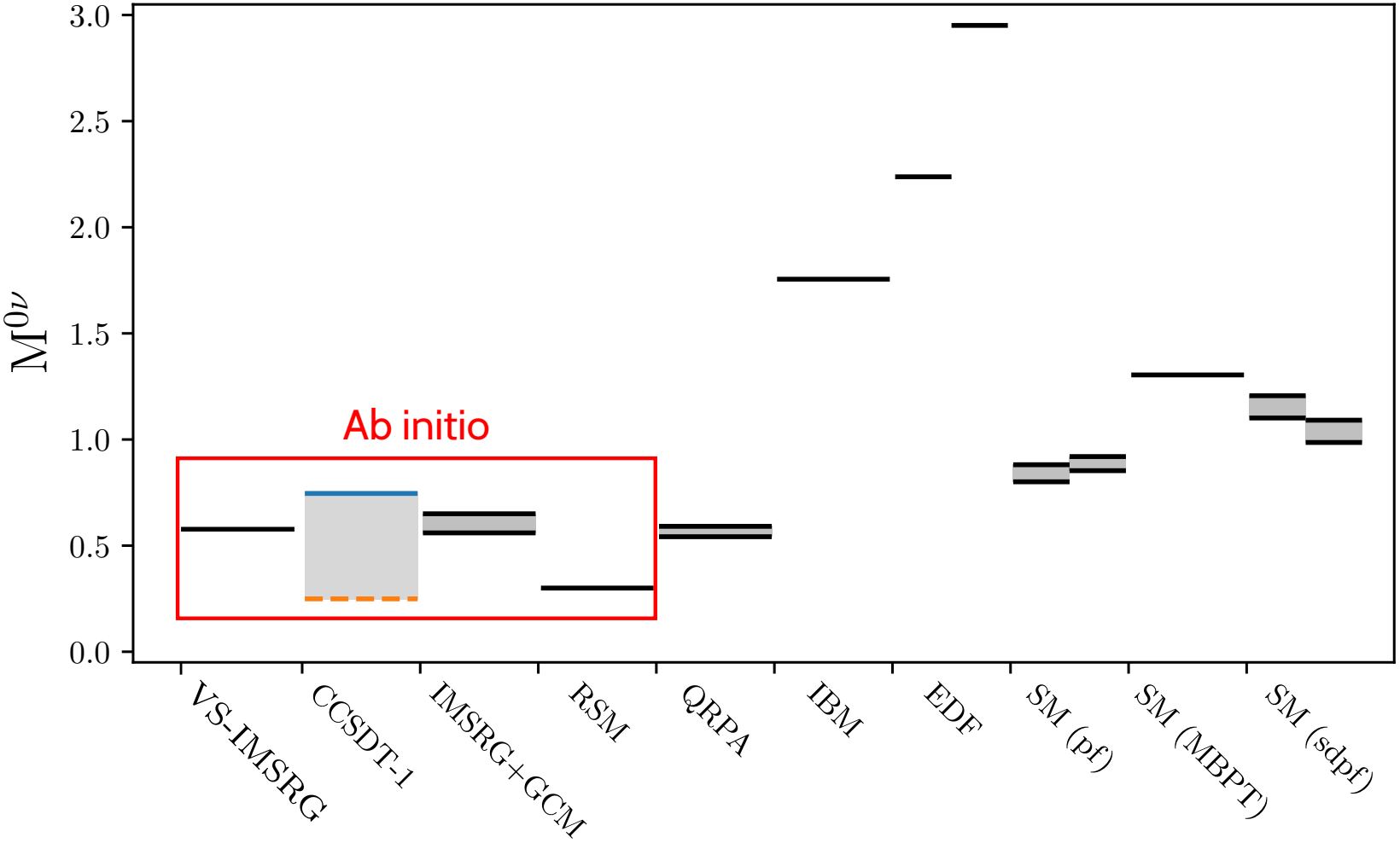
Ab Initio Calculation of Nuclear Matrix Elements

Starting with the usual light-ν exchange…

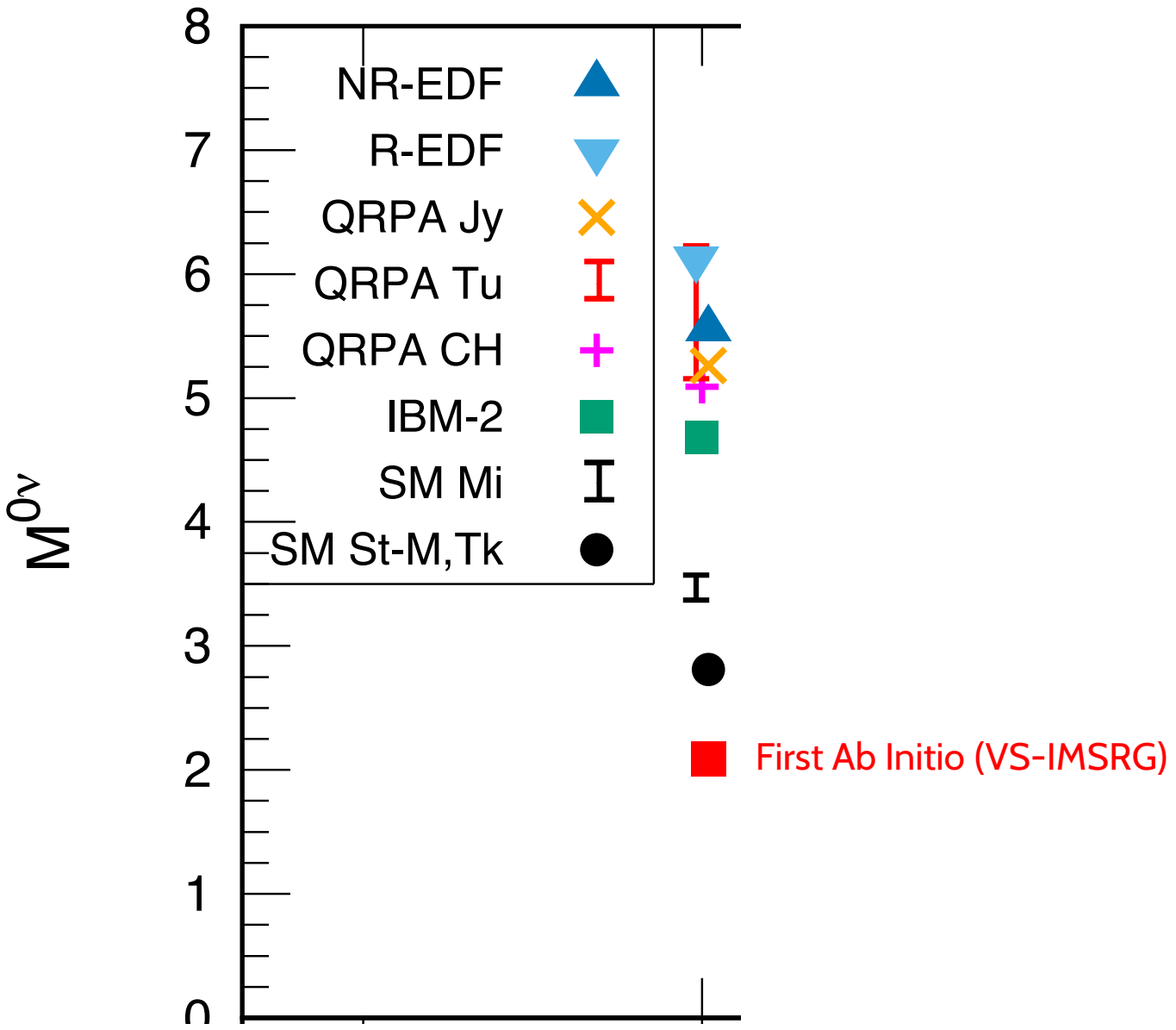
^{48}Ca: Ab-Inito Matrix Elements vs. Older Ones



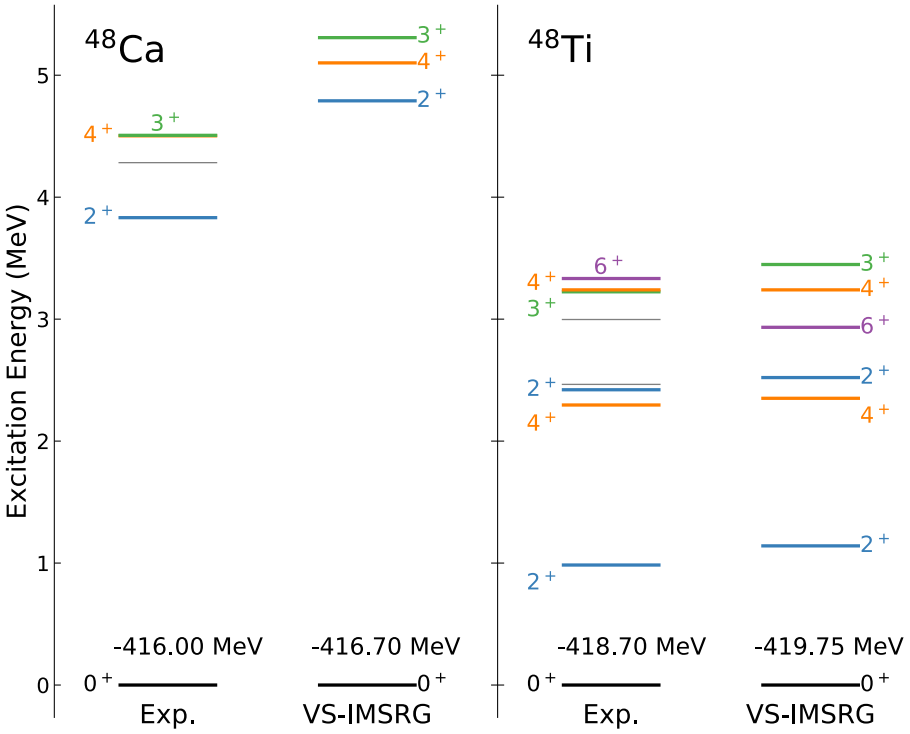
^{48}Ca: Ab-Inito Matrix Elements vs. Older Ones



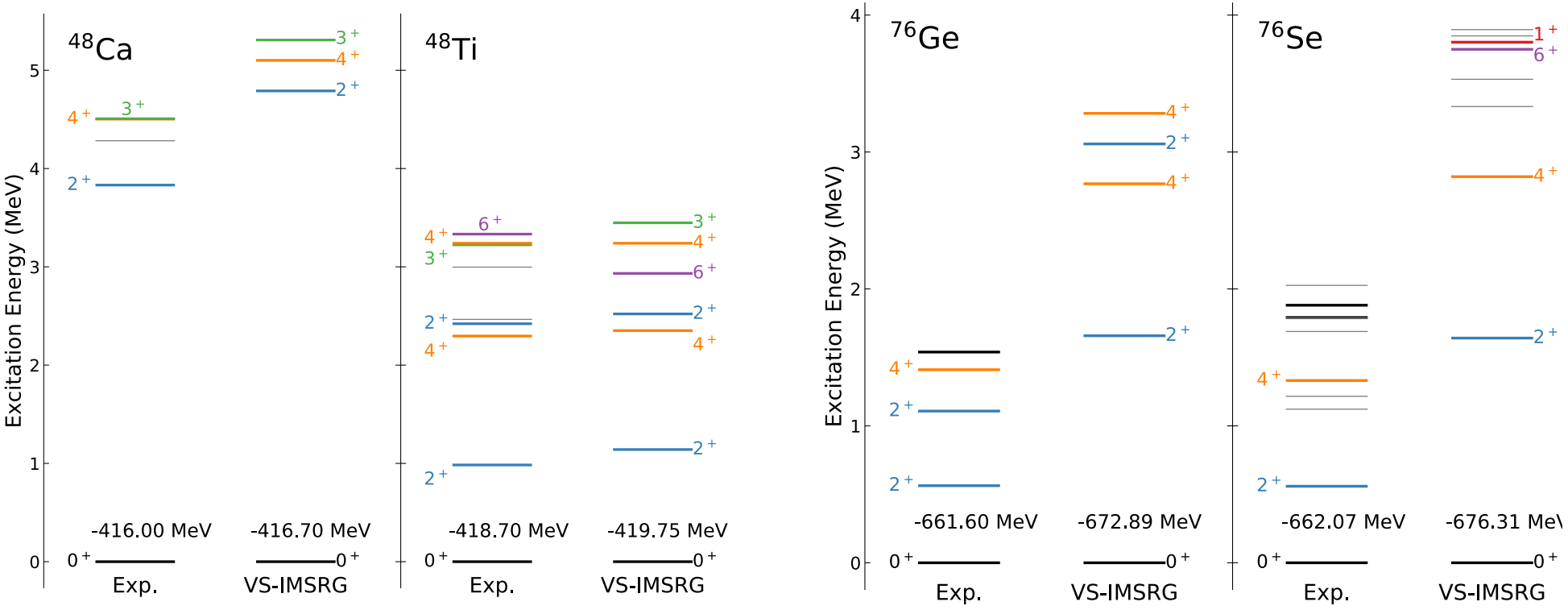
^{76}Ge


8
7
6
5
4
3
2
1
0
$M^{0\nu}$
NR-EDF
R-EDF
QRPA Jy
QRPA Tu
QRPA CH
IBM-2
SM Mi
SM St-M,Tk
First Ab Initio (VS-IMSRG)

Ab Initio Spectra with Valence-Space IMSRG



Ab Initio Spectra with Valence-Space IMSRG



Completing the Computations

Still to do:

1. Go to “next order” in many-body approaches.
2. Include corrections to matrix elements that reflect physics above the pion mass. These include contact operators and many-body currents.
3. Estimate uncertainty. This will involve both benchmarking methods against one another and correlating the matrix elements with other observables.