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- main uncertainties in $\nu + A$ comes from FSI and MBI.
- theoretically it is very difficult $\rightarrow$ phenomenology
- to learn FSI and MBI in $\nu + A$ (A=C,O,Ar) from $\gamma + A$
- CEBAF, MAMI A2 Mainz, ...
- MAMI A2 experiment (real photons 40-1600 MeV) $\gamma + A \rightarrow \pi^0 + X$
- we need 3D (for different incoming photon energy) dependance on momentum of outgoing π^0 and direction
- We propose to the A2 to collect that 3D data for A=C, O, Ar.
- That will be HUGE contribution from A2 to neutrino physics
- predictions for bound nucleon decay in nuclei (C,O,Ar) JUNO, HyperK, DUNE

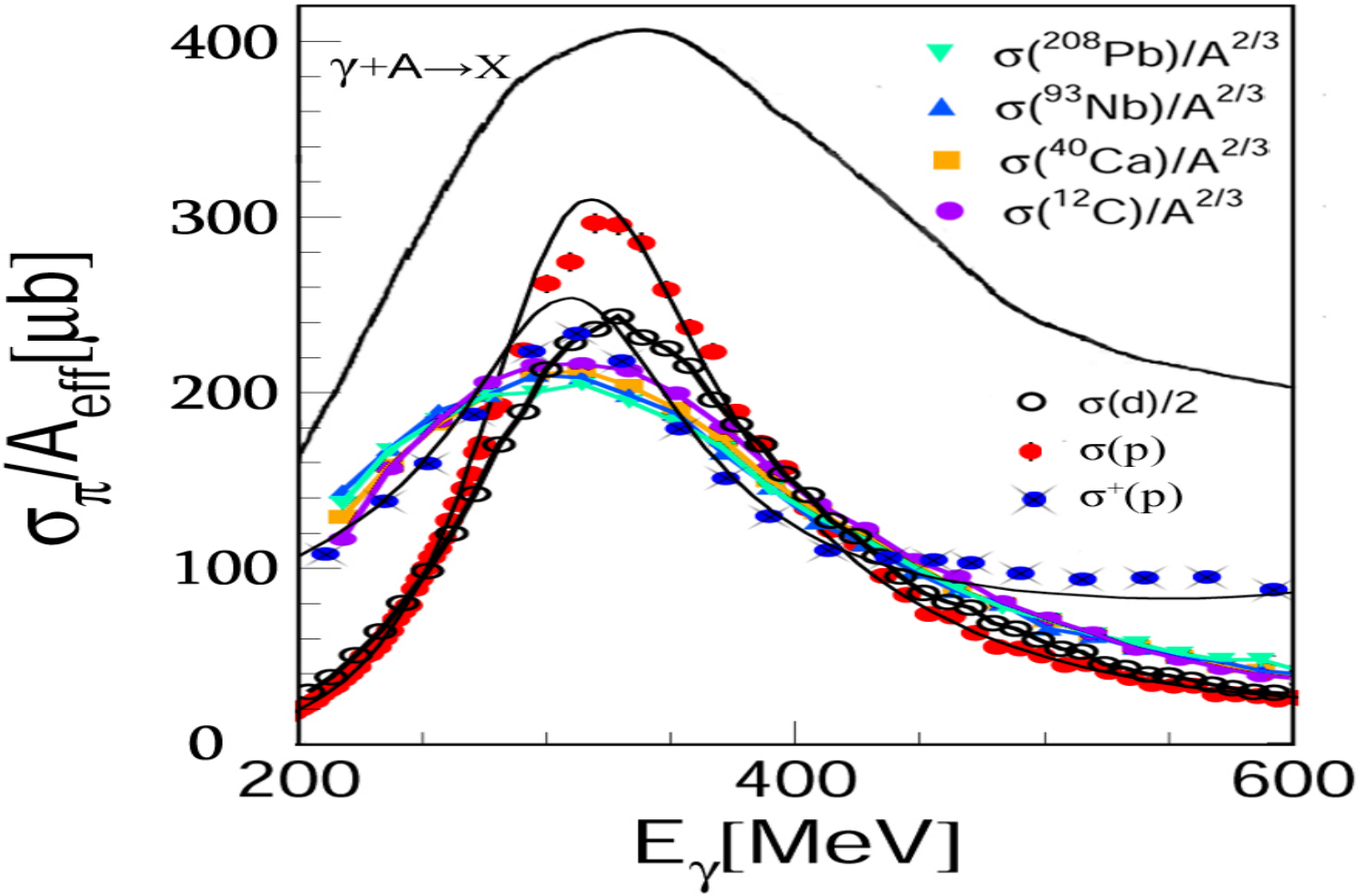

Figure: Plots from A2. Inclusive π^0 production cross sections $\gamma + A \to \pi^0 + X$, A_{eff}=1 for proton, A_{eff}=2 for deuteron and $A_{eff} = A^{2/3}$ for nuclei. σ^+ is the cross section of $\gamma + p \to n + \pi^+$. $\gamma + A \to X$ is (per nucleon) photo-absorption cross section on nuclei, A_{eff}=A.