

Geant 4

Neutron capture in CHIPS low
energy nA physics

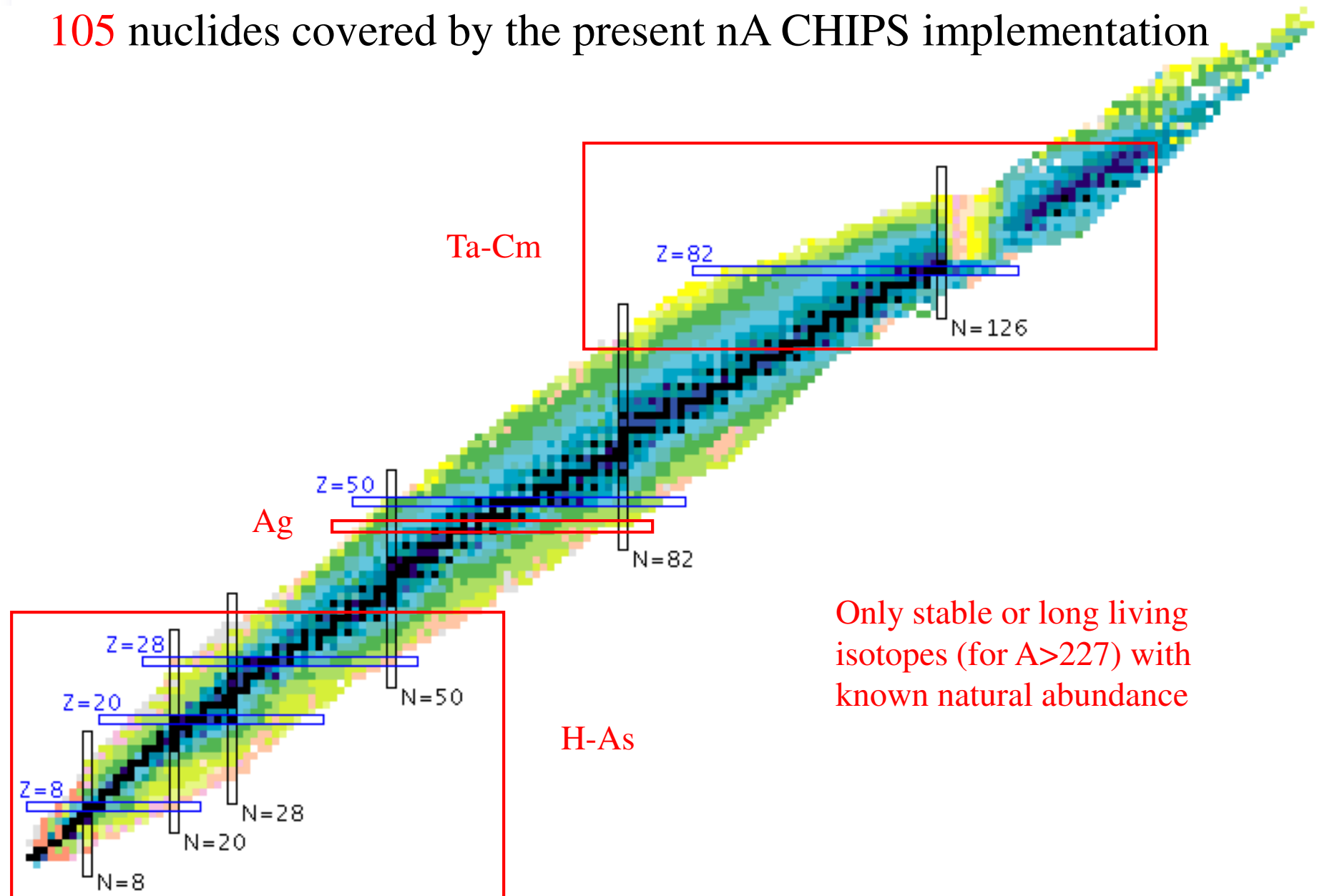
Mikhail Kosov, 14th Geant4 Users
and Collaboration Workshop, 2009



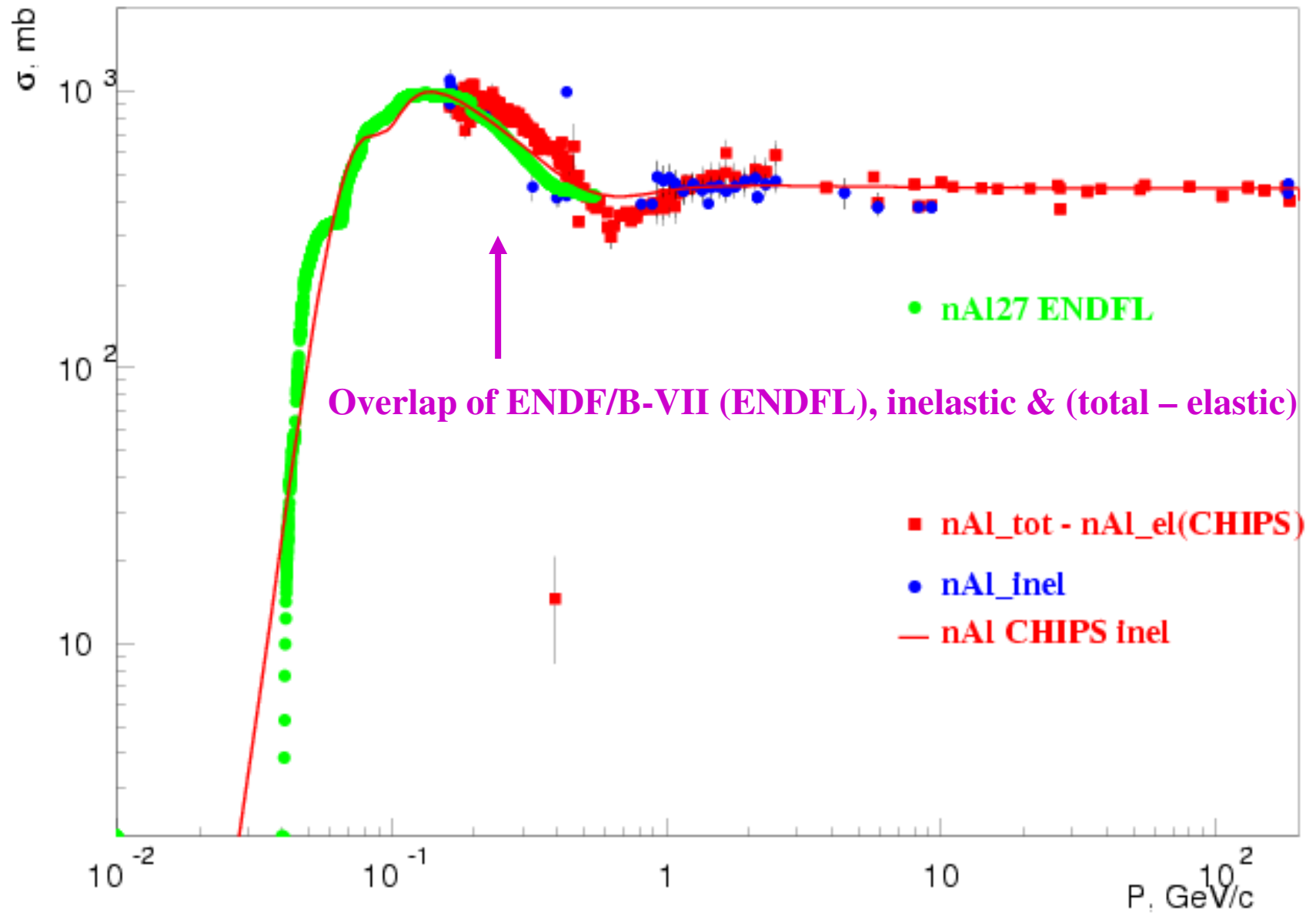
Introduction to low energy CHIPS nA

- New low energy extension of nA CHIPS process is made (including (n, γ)-capture)
 - ENDF/B-VII was used for the cross-sections improvement
 - The $1/v$ low energy part is not implemented yet (planned)
 - The nuclear capture is simulated as a part of inelastic reaction and not as a separate process (compare with LHEP and HP)
- Low energy CHIPS nA is a fast competitor of the heavy HP package (easier to update)
 - The CHIPS (n, γ)-capture is a binary reaction (only one gamma)
 - The rest of inelastic reactions are simulated by CHIPS inelastic
 - CHIPS has its own nA elastic process (reported 2 years ago)

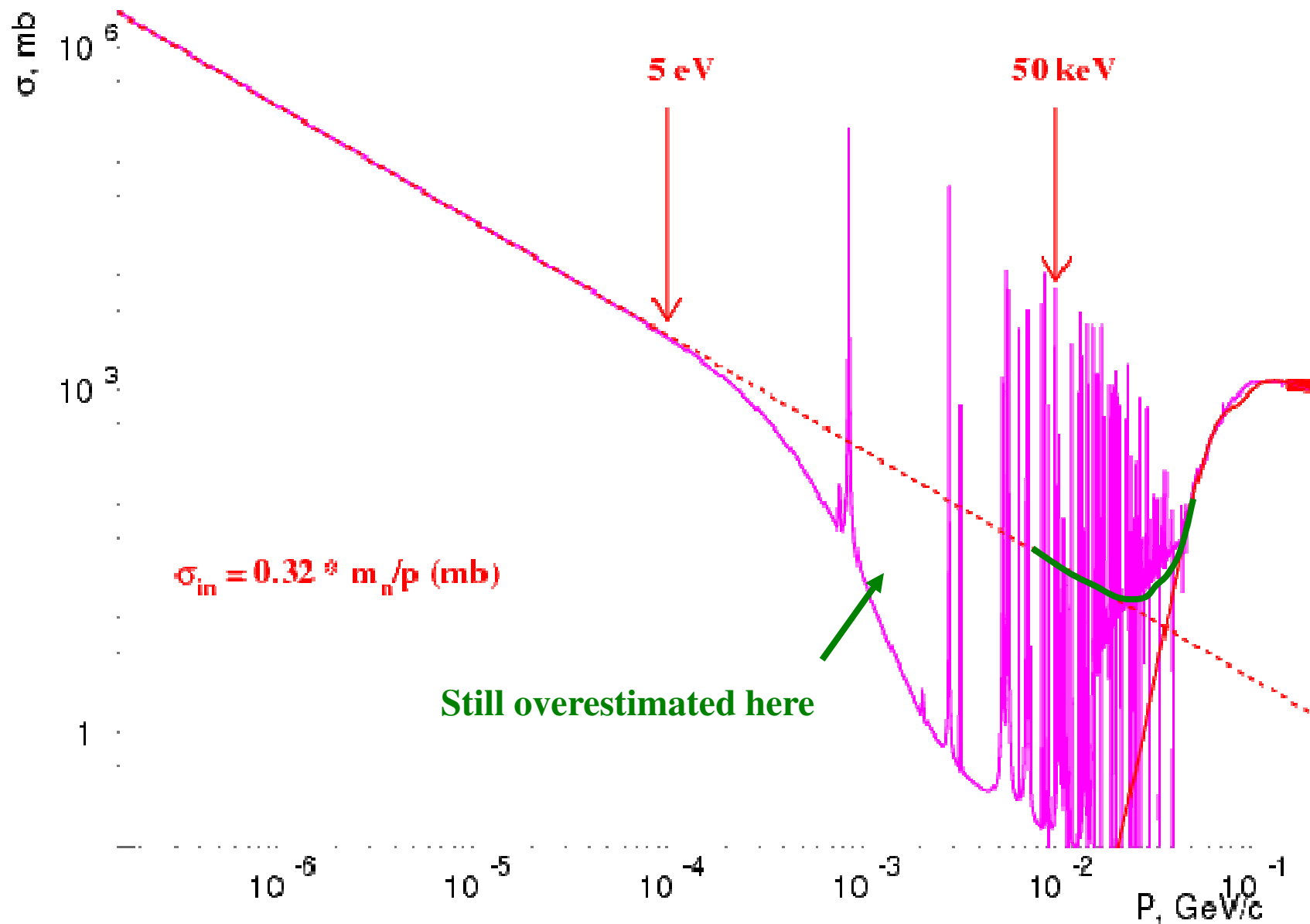
105 nuclides covered by the present nA CHIPS implementation



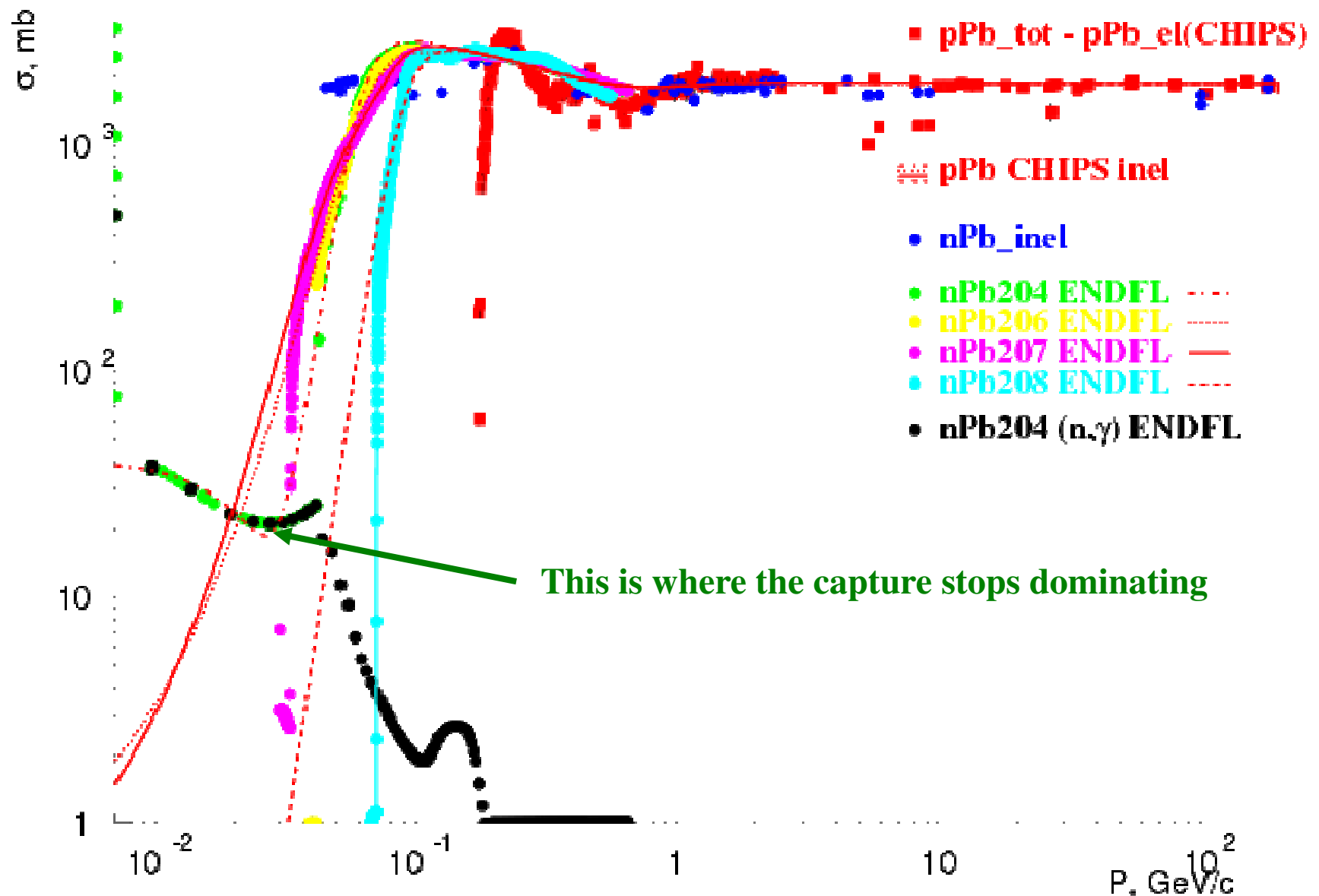
CHIPS improvement of nAl inelastic cross-section



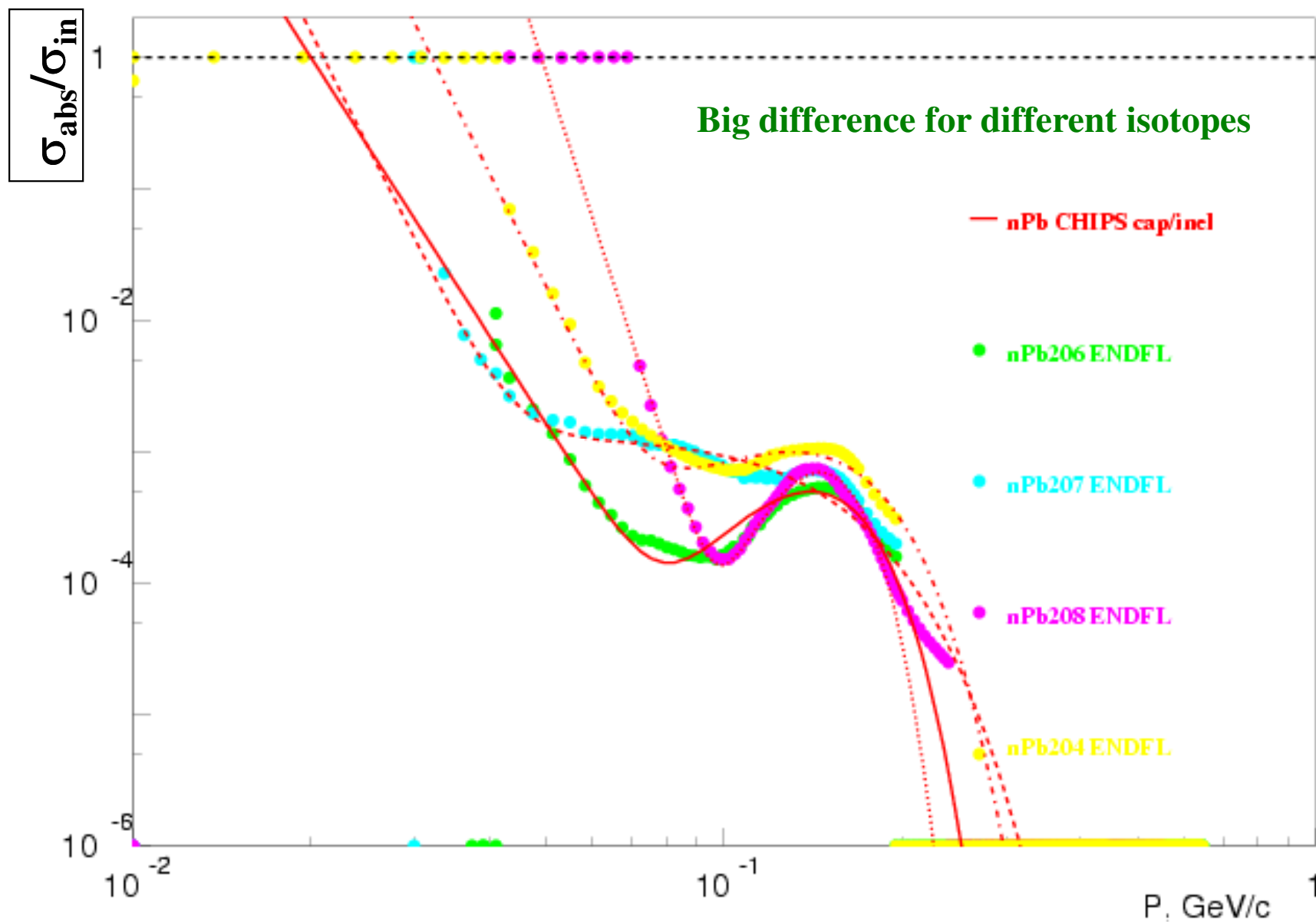
$n^{35}\text{Cl}$ detailed inelastic cross-section (what is not included)



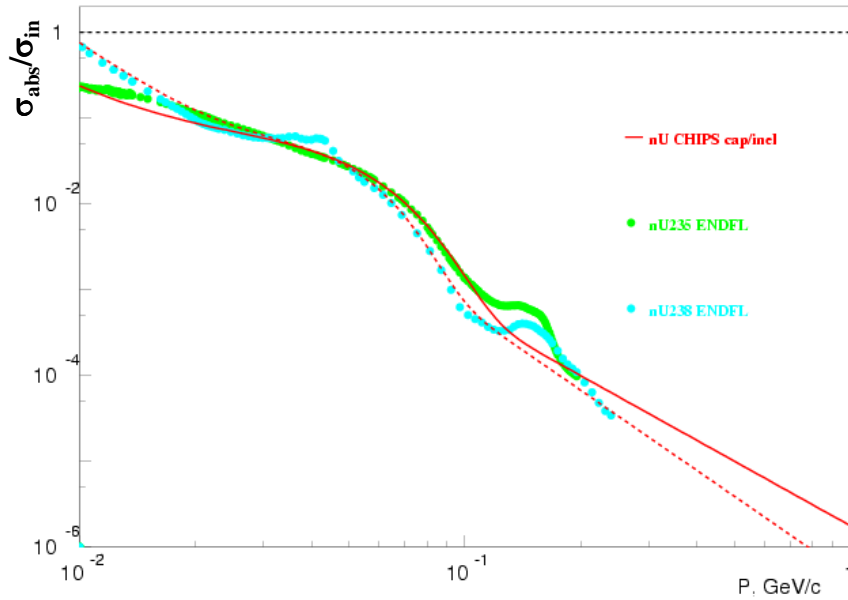
CHIPS improvement of nPb inelastic cross-section



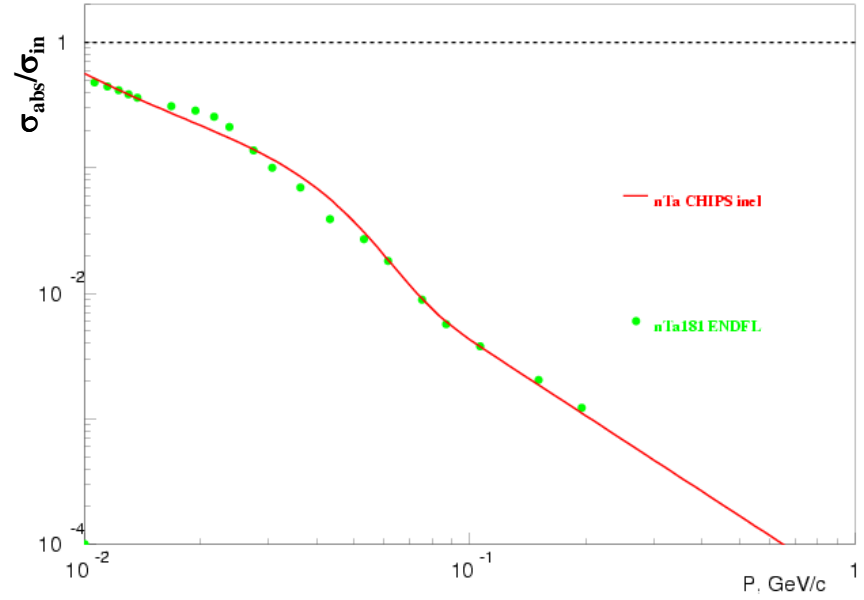
CHIPS percent of nPb capture in inelastic cross-section



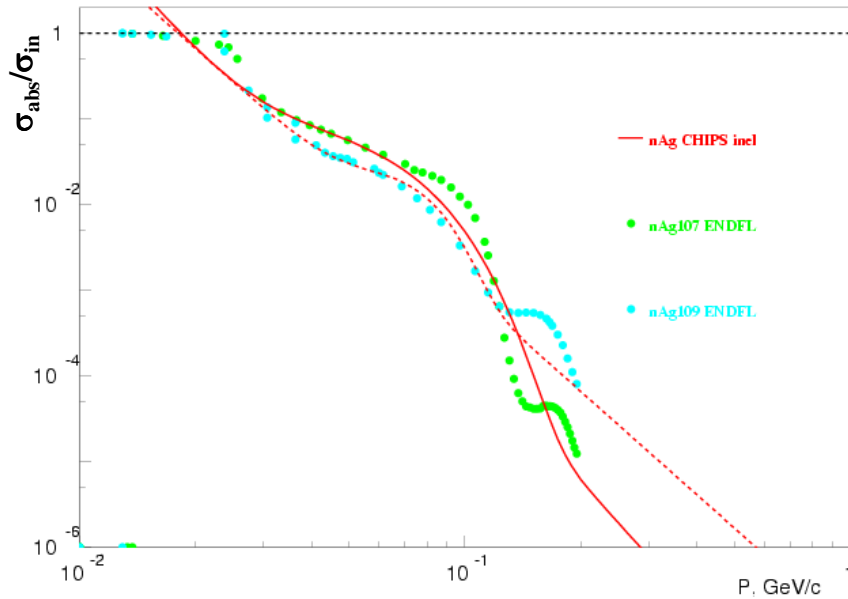
CHIPS percent of nU capture in inelastic cross-section



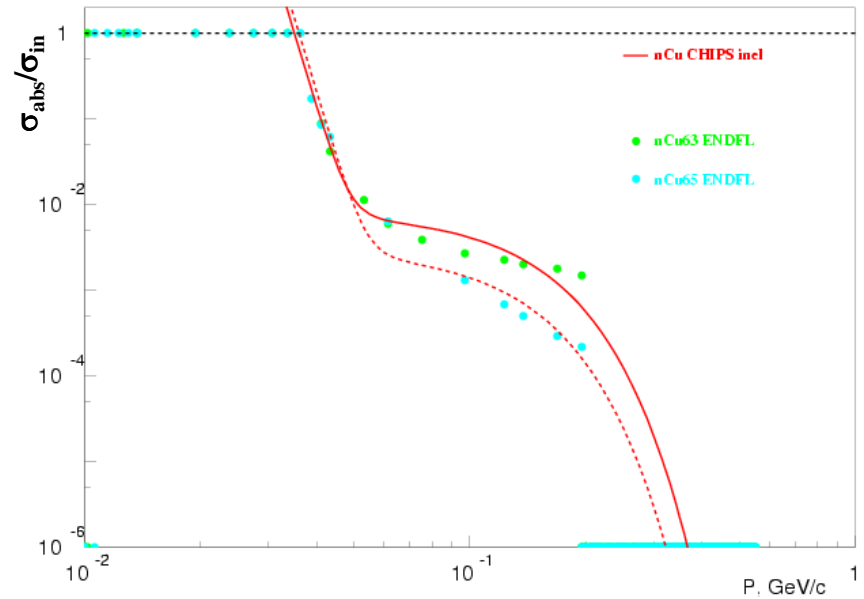
CHIPS percent of nTa capture in inelastic cross-section



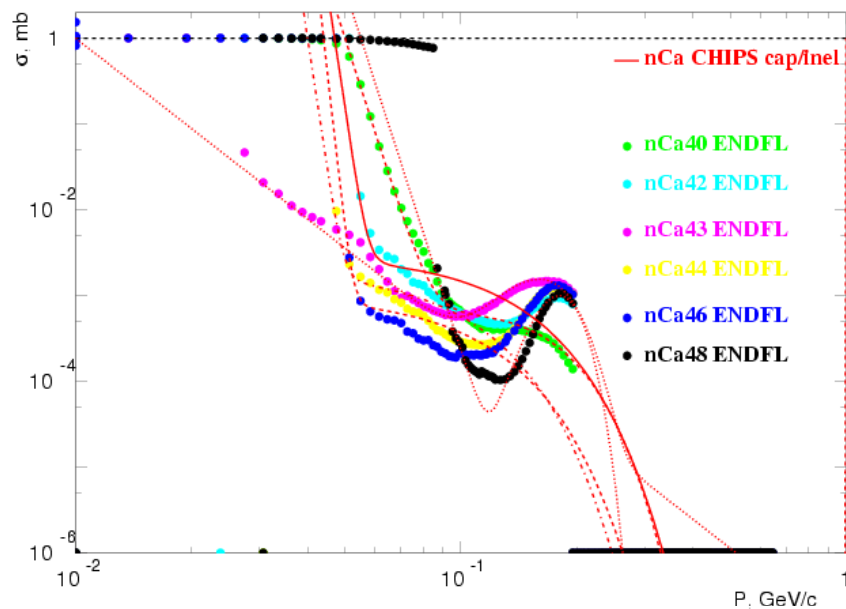
CHIPS percent of nAg capture in inelastic cross-section



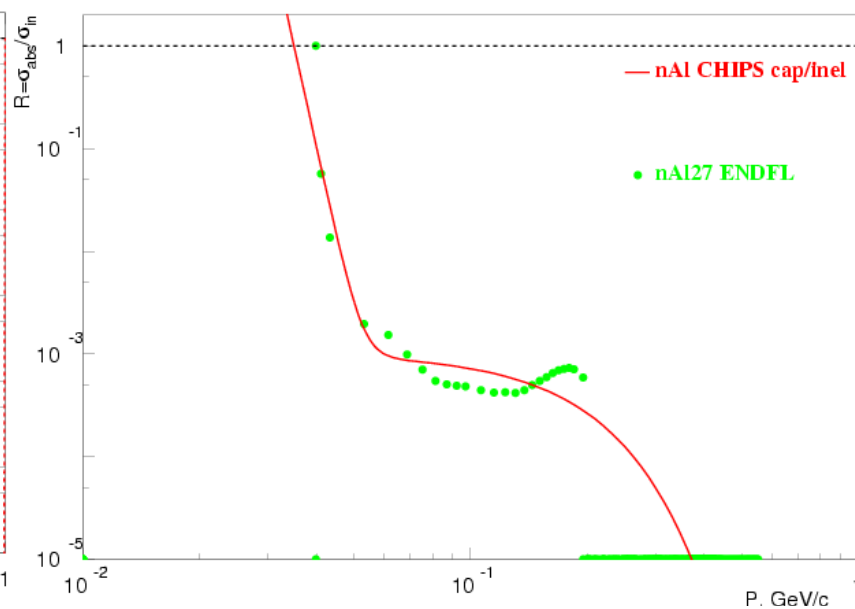
CHIPS percent of nCu capture in inelastic cross-section



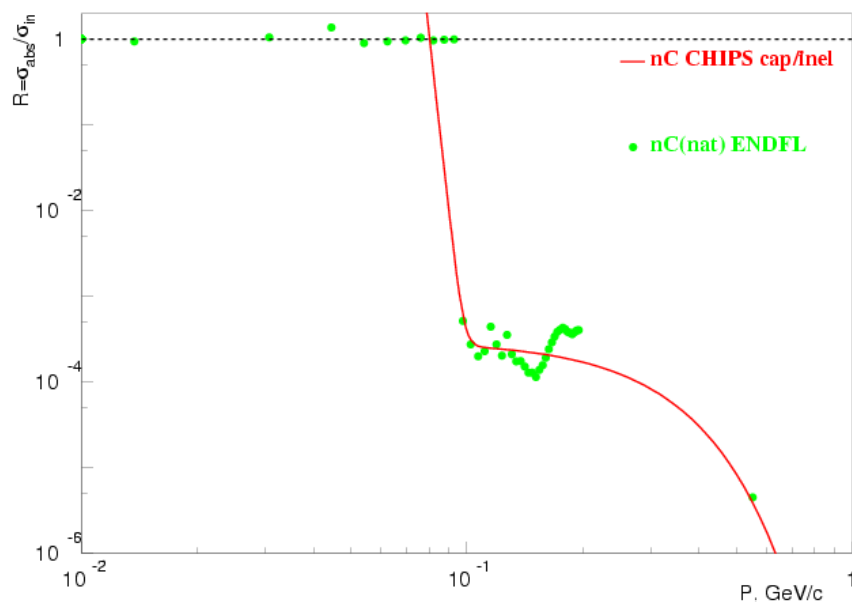
CHIPS percent of nCa capture in inelastic cross-section



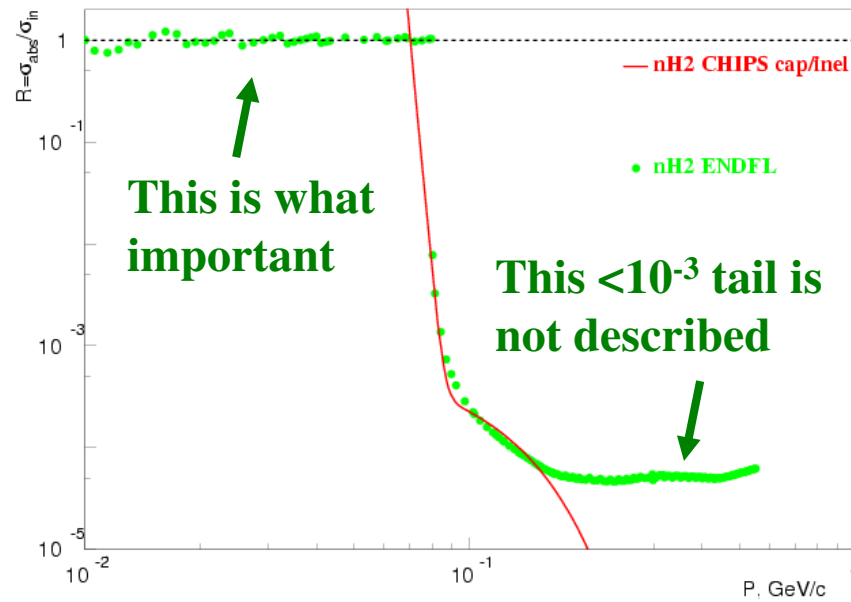
CHIPS percent of nAl capture in the inelastic cross-section



CHIPS percent of nC capture in the inelastic cross-section



CHIPS percent of nH2 capture in the inelastic cross-section





Conclusion

- The low energy CHIPS nA is much simpler than HP and much more accurate than LEP Capture
- It can be easily supported and updated
- Now it is only for 105 isotopes, but can be easily extended for the necessary isotopes
- Now it does not include the lowest energy $1/v$ part (capture), but in near future it will include it
- The CHIPS elastic scattering cross-sections for heavy nuclei still needs improvement
- ... But it is ready to be used. For sure it is going to be used in the new CHIPS physics list. And it is open for testing, comparison, & requirements



Thank you.

Backup slides following.