Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Collective resonances of atomic xenon from the linear to the nonlinear regime[1] YI-JEN CHEN, Center for Free-Electron Laser Science, DESY, STEFAN PABST, ITAMP, Harvard-Smithsonian Center for Astrophysics, ROBIN SANTRA, Center for Free-Electron Laser Science, DESY — We explain the origin of the two collective sub-resonances of the $4d$ giant dipole resonance of atomic Xe recently discovered by nonlinear spectroscopy. In the case of one-photon absorption, while a change in the resonant-like feature in the cross section upon the inclusion of electronic correlations has been commonly attributed to a change of the resonance parameters of a single resonance state, we show that this modification is a result of switching between the relative visibilities of the underlying resonance states. In addition, we predict hitherto undiscovered collective $4d$ resonance states in Xe that can only be accessed through multiphoton absorption. Unlike any known collective feature in atoms, these resonances are exceptionally long-lived (more than 100 attoseconds), thus opening up possibilities to probe new collective effects in atoms with modern XUV light sources.

[1]S.P. is funded by the Alexander von Humboldt Foun- dation and by the NSF through a grant to ITAMP.

Yi-Jen Chen
Center for Free-Electron Laser Science, DESY

Date submitted: 14 Jan 2016 Electronic form version 1.4