

FEMTOCHEMISTRY

Ideas at the Frontier

- Imaging the electron wavefunctions.
- Coherence imaging of mesoscale dynamics.
- Two time coherence imaging- coherent speckle spectroscopy.
- Photon cannon to create populations followed by probe, four wave mixing, temporally shaped coherent control pulses, etc.
- X-ray laser could define structural changes caused by a temporally shaped coherent control pulse, i.e. solve the inversion problem of what a temporally controlled pulse does.
- Ultrafast x-ray absorption fine structure- movies of solvent participation in reactive dynamics.

FEL Requirements

- Reproducible temporal, spectral, and phase FEL profiles.
- Lower limit needs to be ~ 4.64 eV, i.e. 3x Ti:Sapphire.
- $\Delta T < 20$ fsec required for coherent control using electronic states.
Bandwidth is crucial for accessing different electronic states.
- Need to shape FEL pulse for coherent control.
- It would sure be nice to get FEL frequency into EXAFS range.