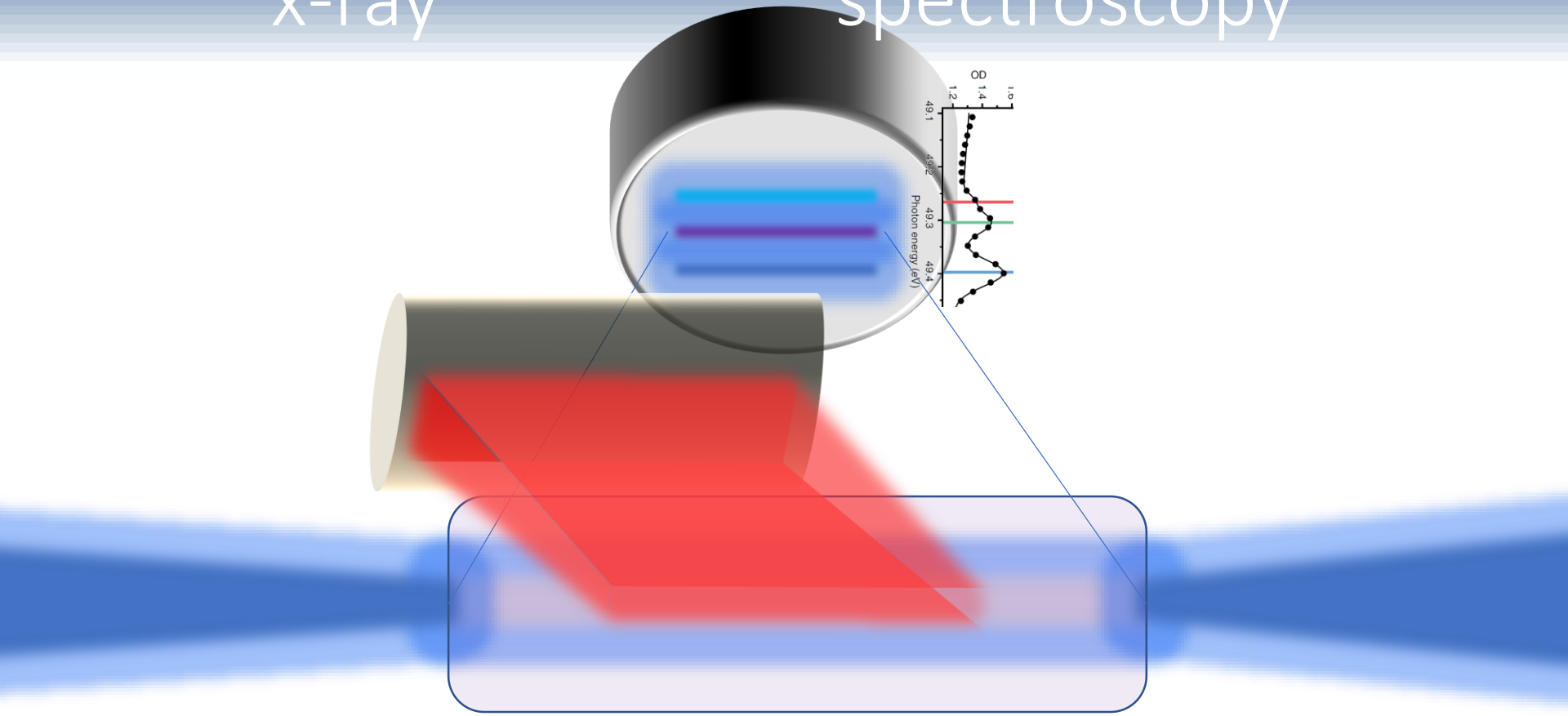
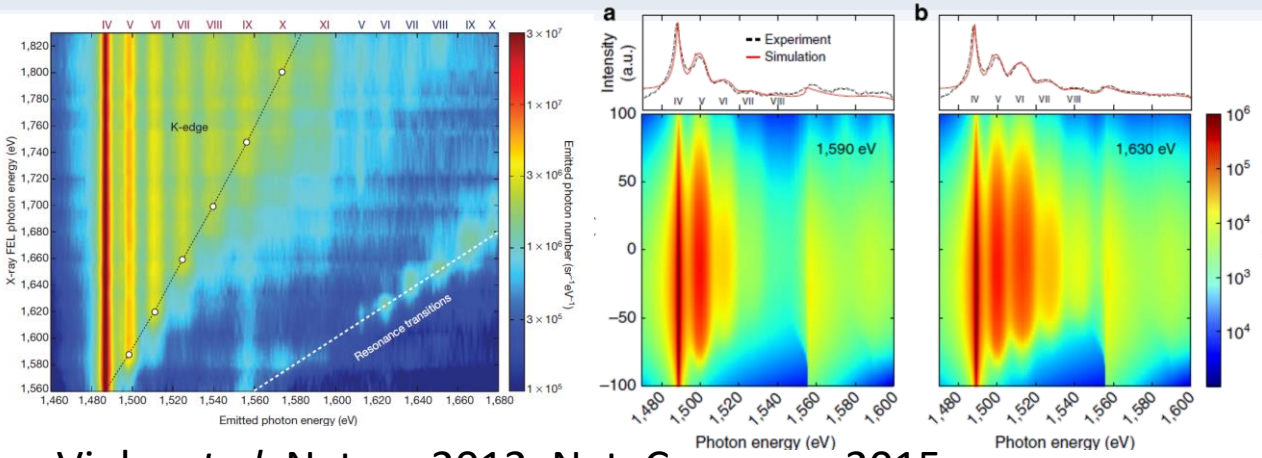
Spatio-temporally resolved x-ray spectroscopy



Many upcoming science opportunities, e.g.:

- Observe the (transverse) complement of lasing: **(quenched) fluorescence**, also laser-induced
- With optical laser: Ultrashort **lifetimes of highly charged ion states**, also in plasmas (density dependence)
- XUV- or laser-induced **Stark shifts of core-level transitions**

Spatio-temporally resolved x-ray Stark-shift spectroscopy



Vinko *et al.* Nature 2012, Nat. Commun. 2015

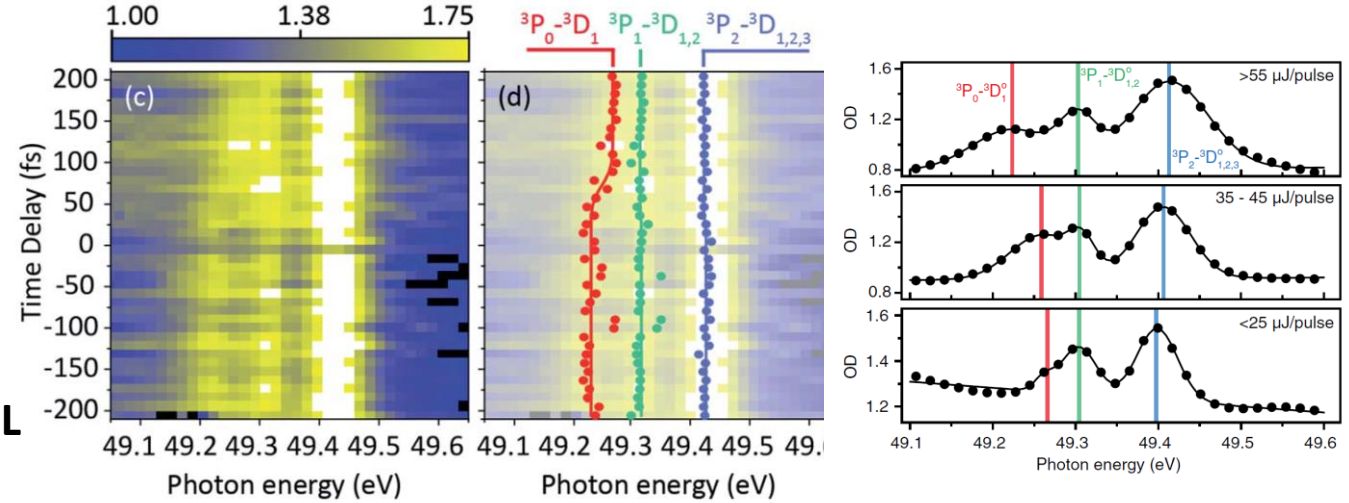
Transient ion-state formation
observed in dense media (left)

Modelled by theory (right):
Involves time-dependence,
thus far not observed in experiments

Time-resolved Stark shifts already observed on XUV spectrometer

⇒ **Time-resolved gating of ion-state formation is experientally possible**

⇒ **with new setup @EuXFEL access to spatial domain**



Ding *et al.* Faraday Disc. 2020 & PRL 2019