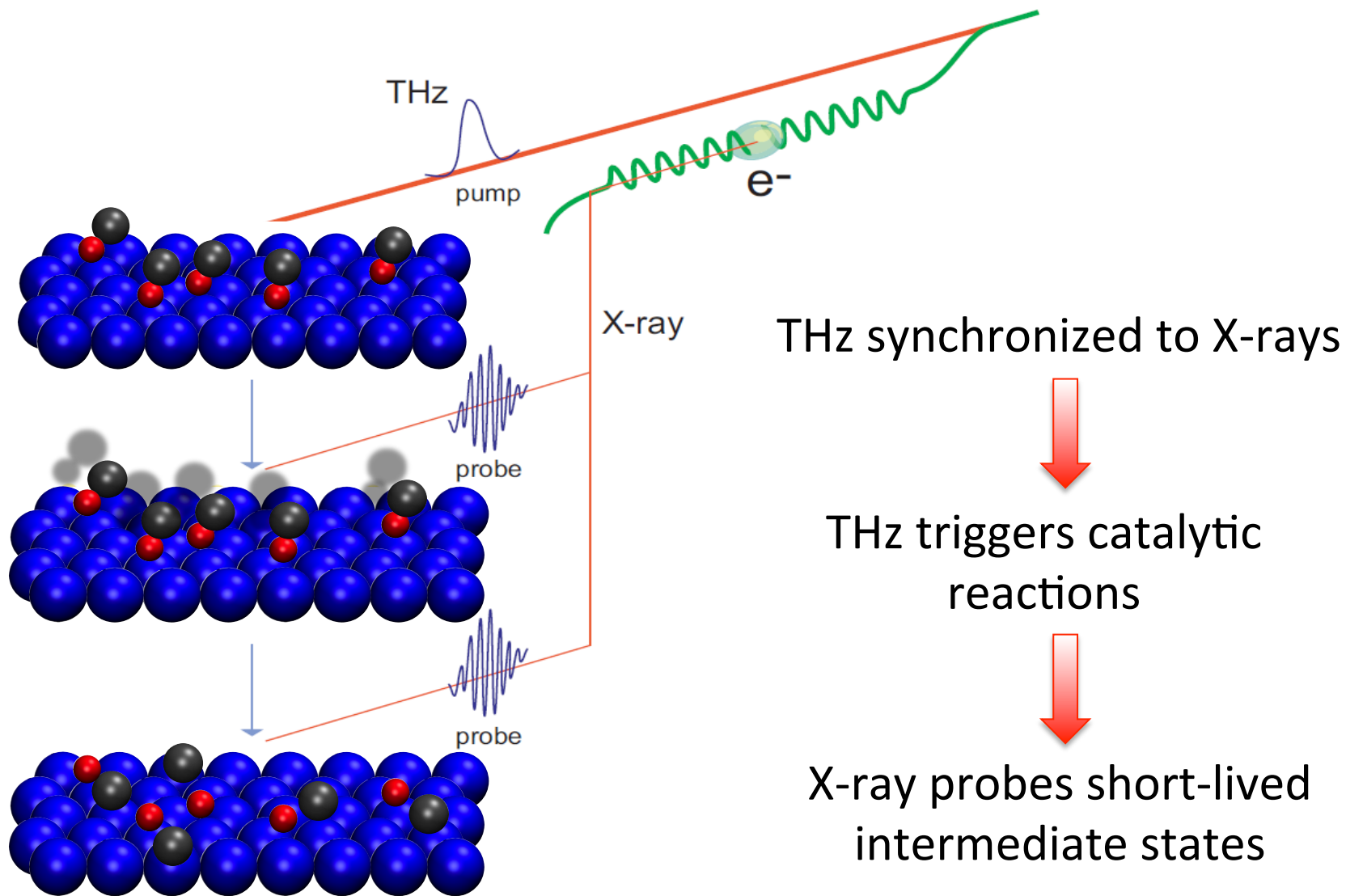


Initiation of catalytic reactions by THz pulses and characterization of short-lived intermediate states by X-rays

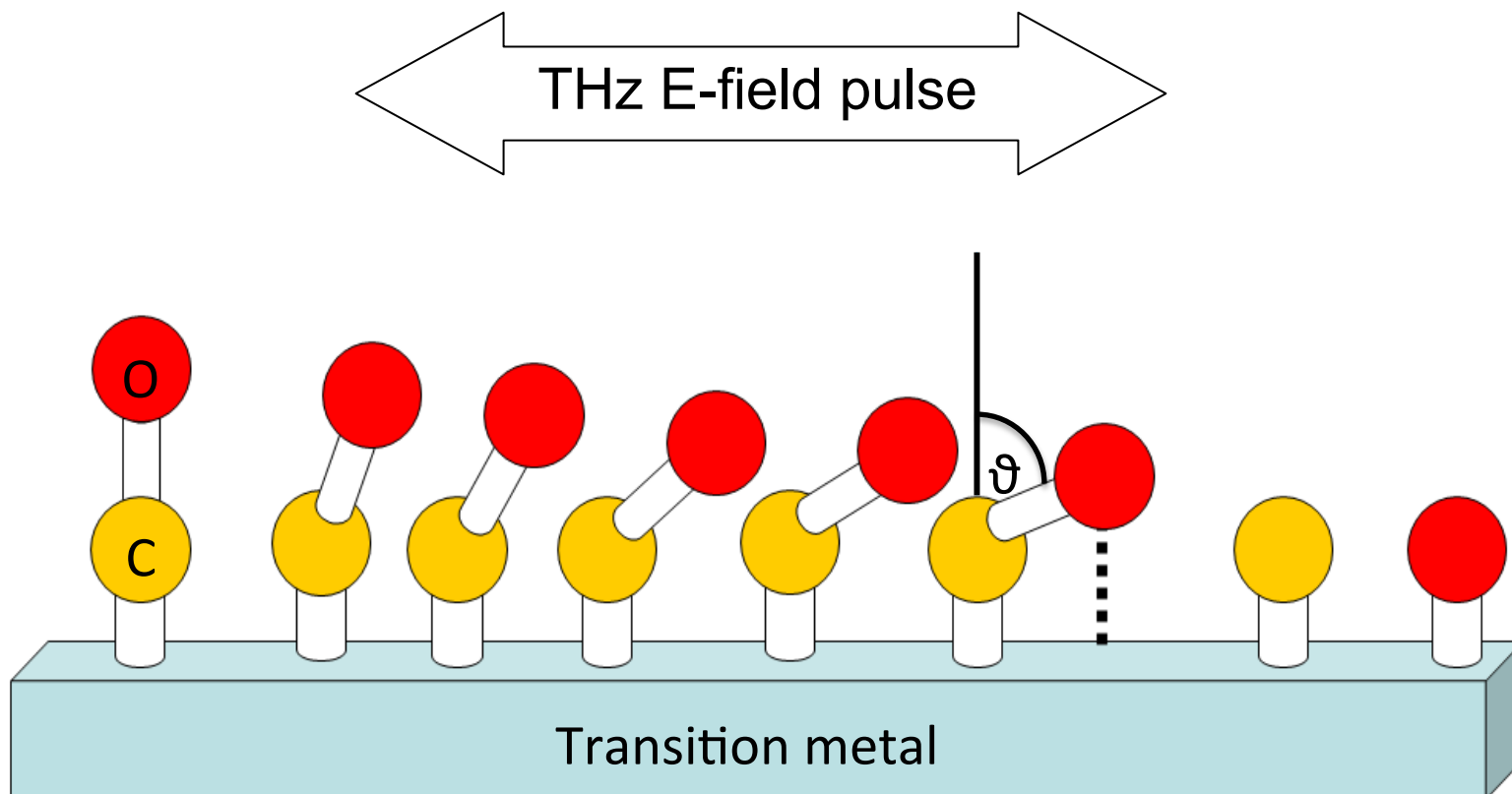
Anastasija Ichsanow

Paul Scherrer Institute, 5232 Villigen PSI, Switzerland

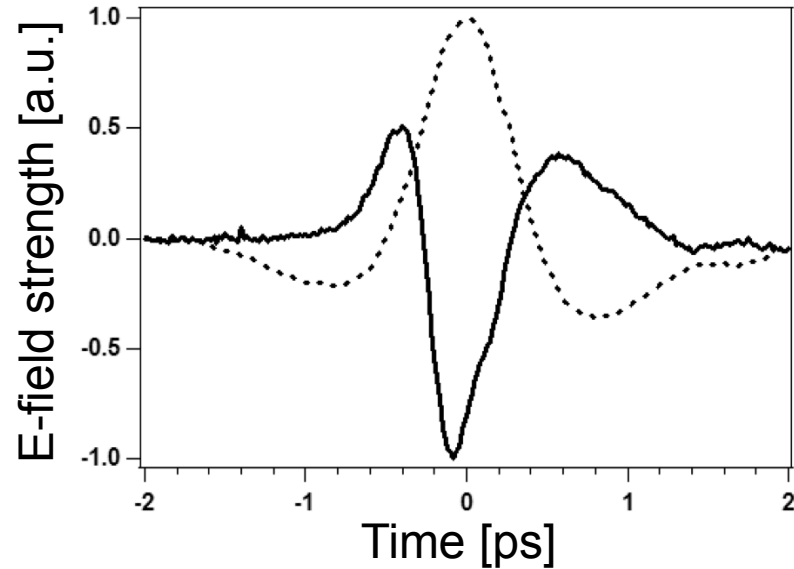
Introduction



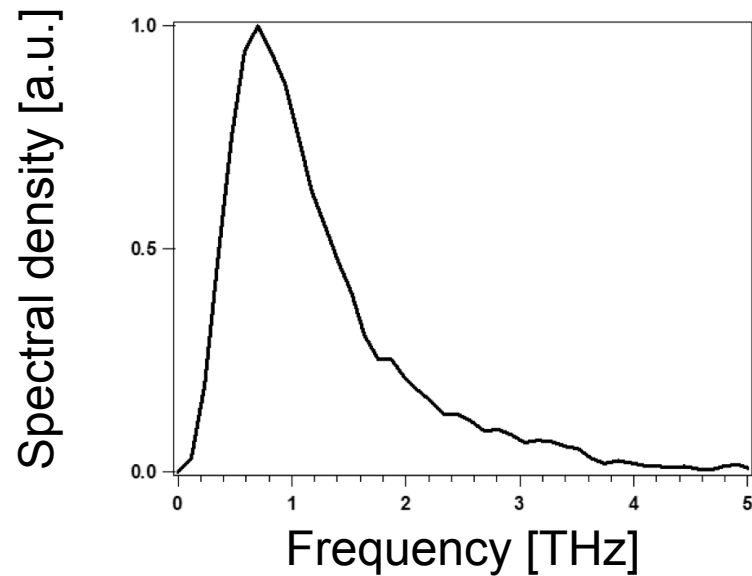
THz-pump



THz pulse



generated by non-linear optics in a plasma



@ PSI
> 1 MV/cm
~ 10 μ J
~ 1 mm²

Parameter table

Beam Parameters	Unit	Requirement	Remarks
Energy	keV	L3 edges of Ru, Rh, Pd + Pt, Au: (2.8-3.2 + 11.6, 11.9)	
Bandwidth	%	Dispersive mode: 0.5 Scanning mode: 0.005	
Ph/pulse stability		10%	Normalization accuracy in scanning mode: 0.01%
Pulse length	fs	200	Time resolution defined by THz pump pulse

Parameter Changes		Requirement	Remarks
Energy	Range / step	50 / 0.5 eV	In scanning mode
Pump-probe delay	Range	-10 – 100 ps	

Beam geometry	Requirement	Remarks
	Dispersive single-shot spectrometer	

Other		Requirement	Remarks
THz pump source	$\frac{1}{2}$ cycle and multiple pulse trains	$E(\max) > 3$ MV/cm	



Collaboration

Bruce Patterson (Project leader)

Hans Sigg (Infrared)

Jeroen van Bokhoven (Catalysis)

Jacinto Sà (Catalysis)

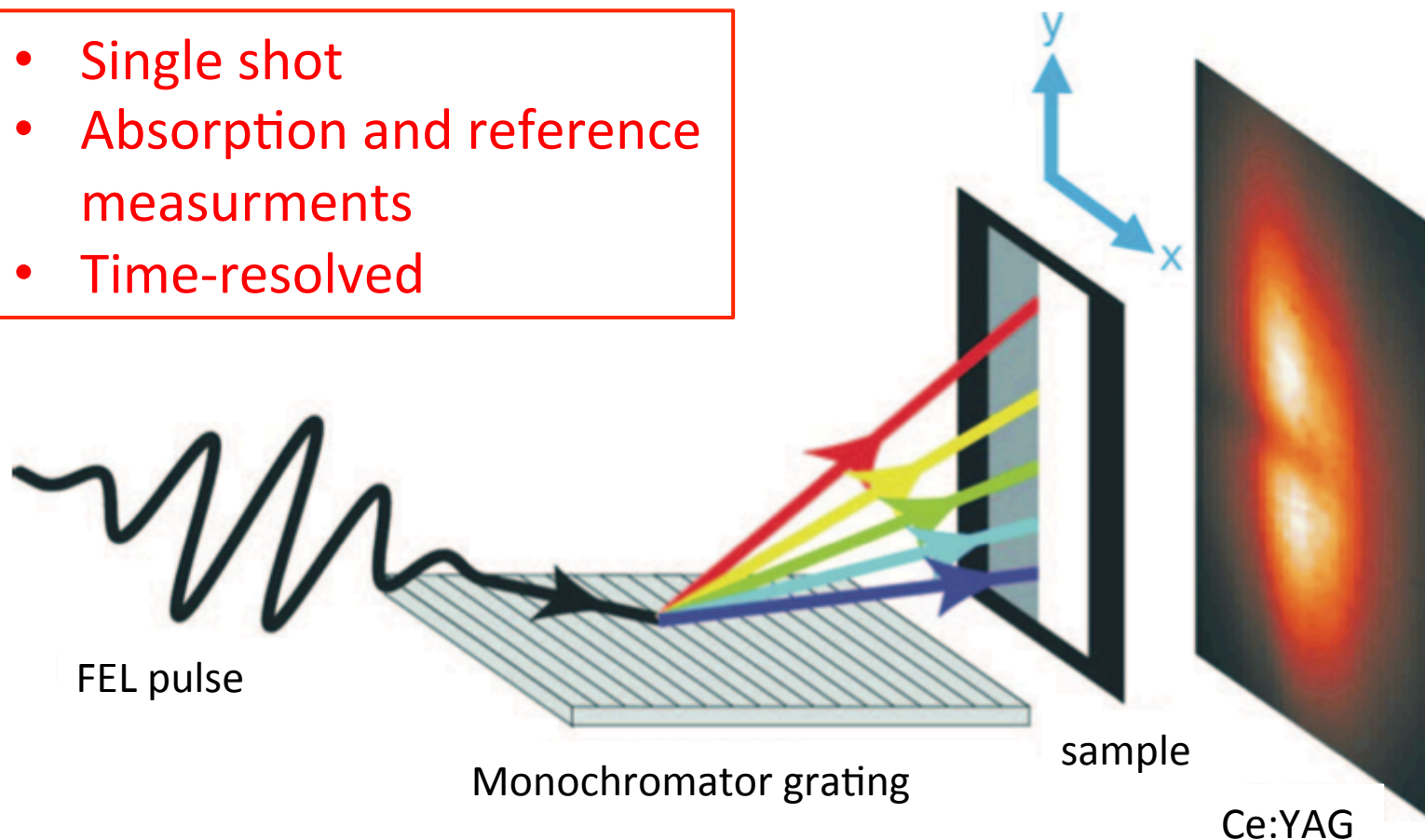
Christoph Hauri (THz)

Clemens Ruchert (THz)

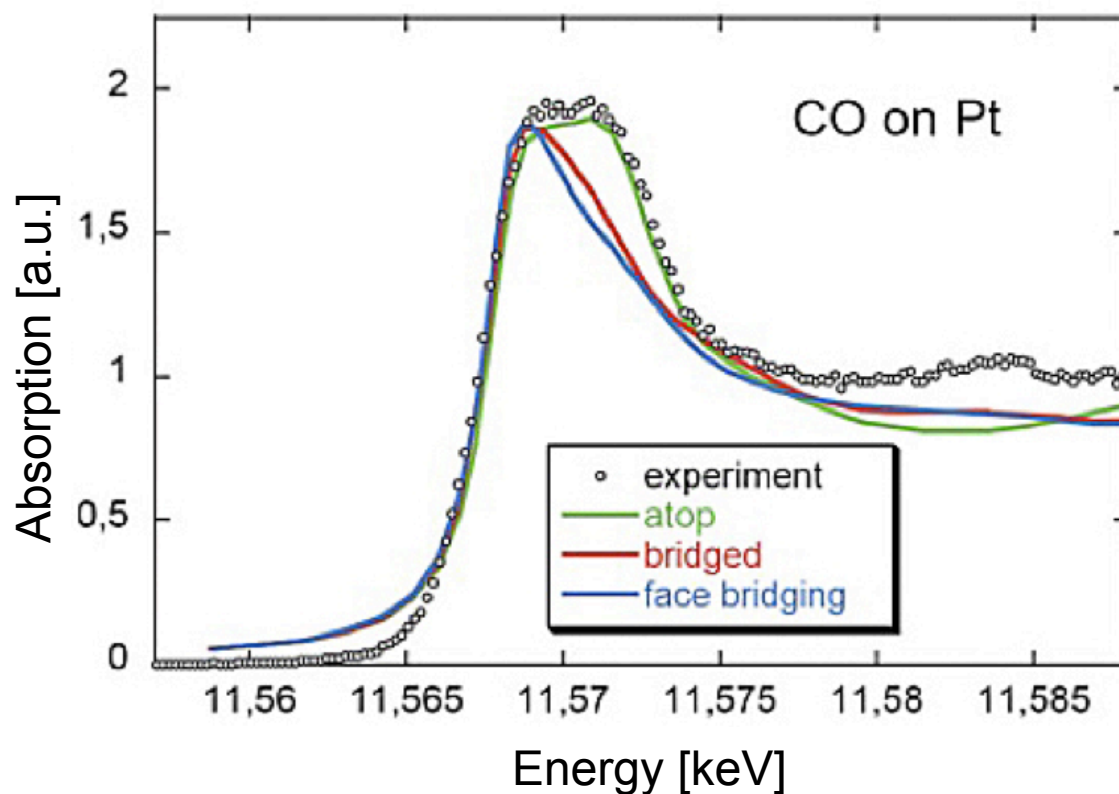
X-ray-probe (NEXAFS)

Near-Edge X-ray Absorption Fine Structure

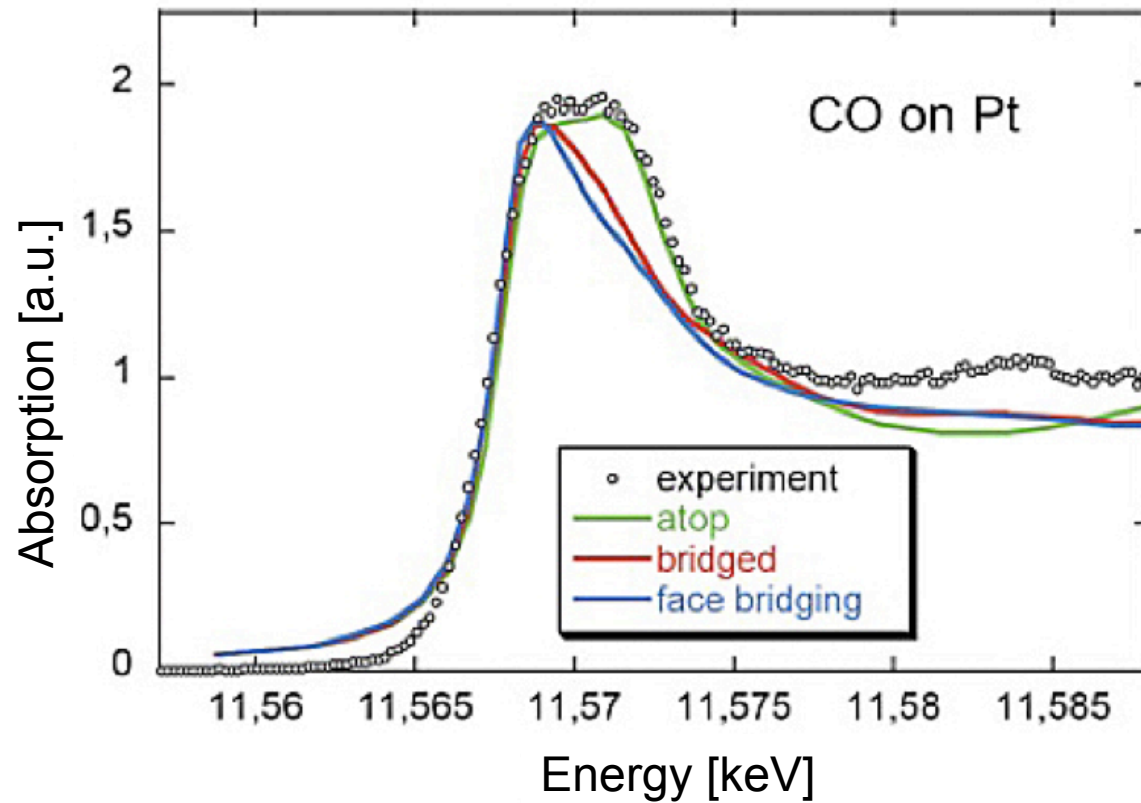
- Single shot
- Absorption and reference measurements
- Time-resolved



X-ray-probe (NEXAFS)



X-ray-probe (NEXAFS)



THz-pump

