

LEAF



Research Activities at BNL's Laser-Electron Accelerator Facility

Sean McIlroy, Tomasz Szreder, Yuzhen
Shen, Andrew Cook, John Millar, Sergei
Lymar, James F. Wishart

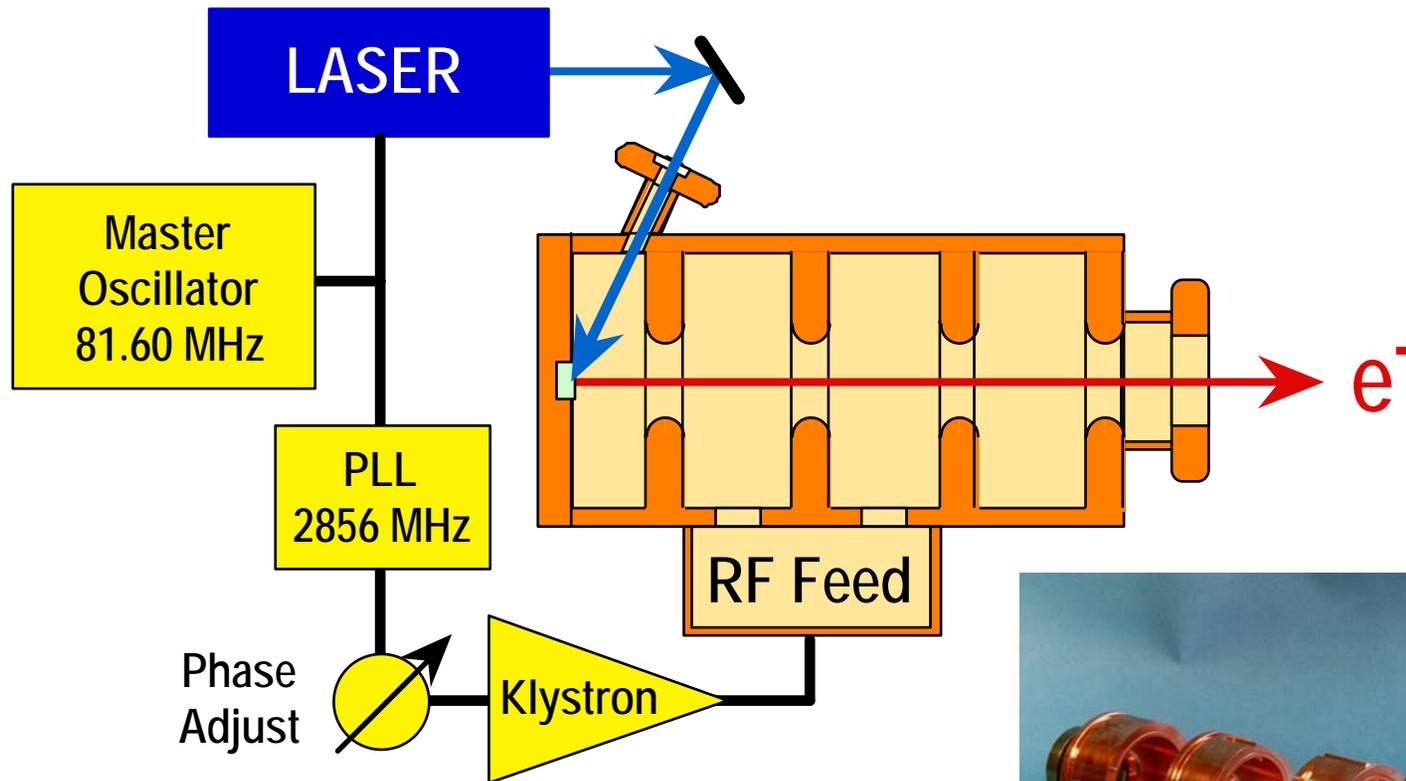
Chemistry Department

Brookhaven National Laboratory

Office of Basic Energy Sciences
U.S. Department of Energy

BROOKHAVEN
NATIONAL LABORATORY

Laser – RF Synchronization at LEAF



Beam Energy: 9 MeV

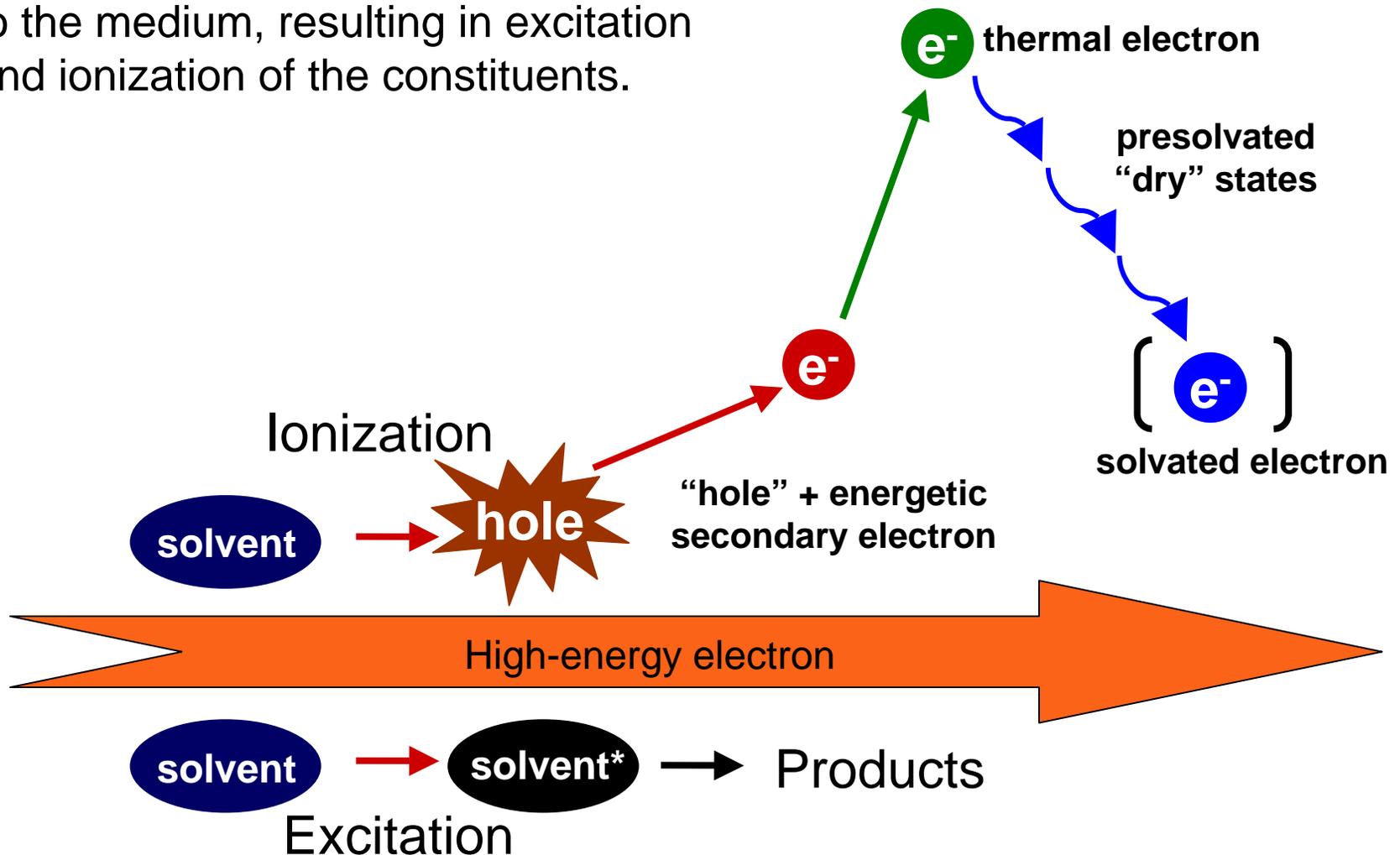
Pulse Width ≥ 7 ps

Pulse Charge up to 10 nC



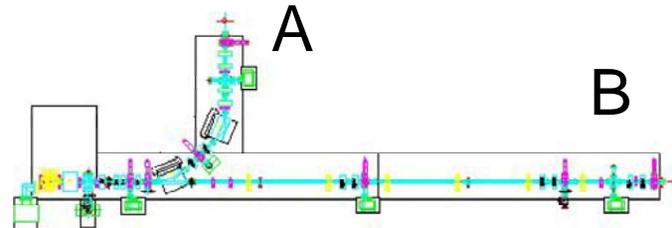
Initial Events in Radiolysis

High-energy electrons transfer energy to the medium, resulting in excitation and ionization of the constituents.



Capabilities

Electron pulses may be directed to one of two beam lines at which different experimental types are performed.



A Target (curved beam line), pulse-probe experiments

Picosecond synchronized, variable delay laser probe detection

Time resolution set by pulse width and sample depth

Typically 9 – 13 ps in 1 cm cell

Flow cells

Full timescale: ≤ 10 ns (typically 40-60 min per scan, 20-40 shots/time point)

B Target (straight beam line), transient digitizer experiments

Pulsed Xenon arc lamp, or Laser Diode monitoring source

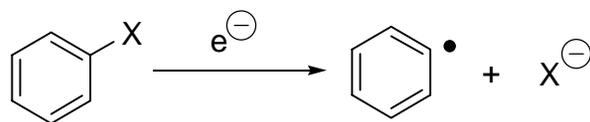
Detection using fast diode (Si, Ge, InGaAs) or biplanar phototube and digitizer

Time resolution down to ~ 75 ps for time 1 ns – 40 μ s in visible

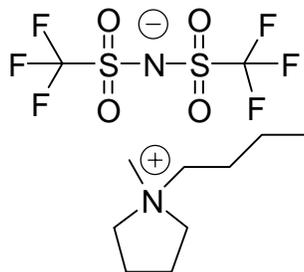
Static cells - spectrophotometer cuvettes or cylindrical cells

Experiments

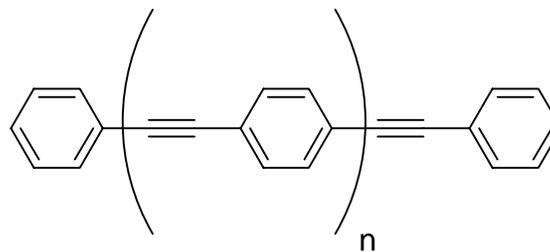
- Dissociative Electron Attachment in Aryl Halides



- Ionic Liquids

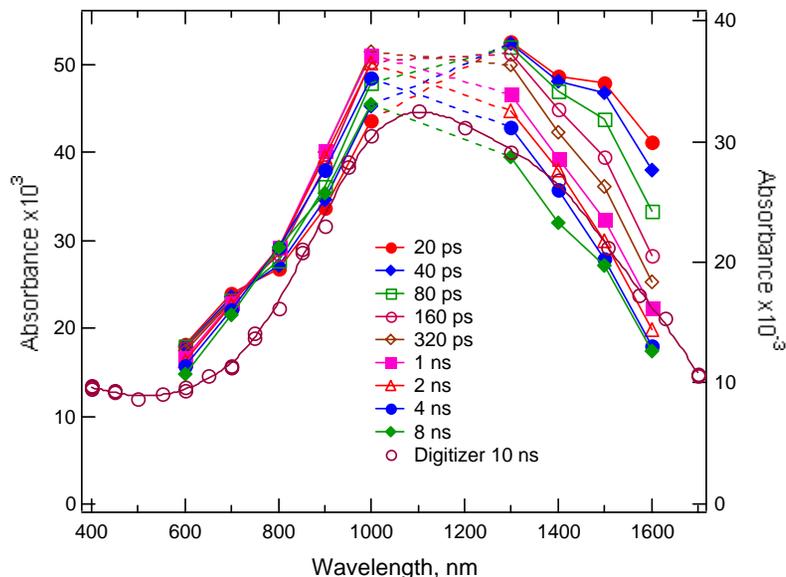
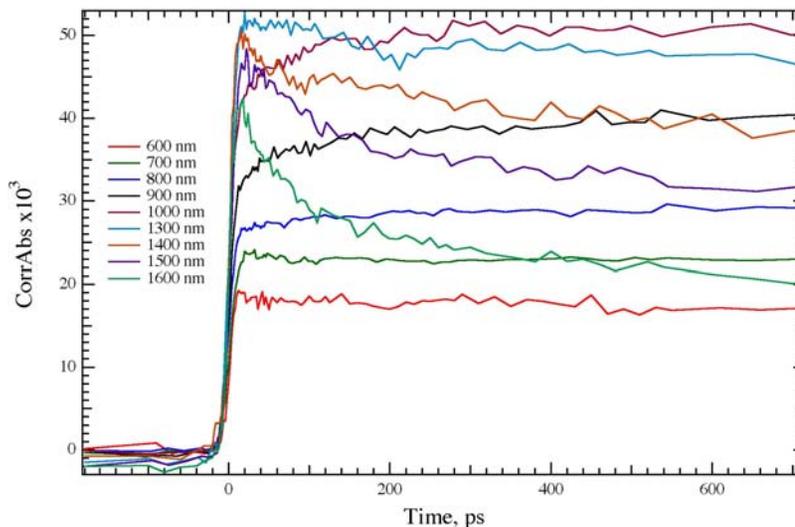
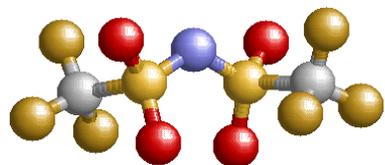
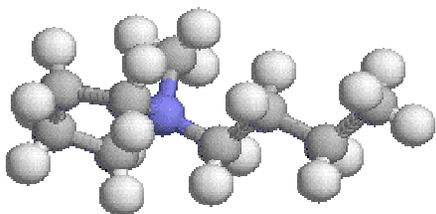


- Charge Transfer Through Molecular Wires



Observing Electron Solvation in an Ionic Liquid by NIR Pulse-Probe

$P_{14}NTf_2$



LEAF Facility Layout

