



... for a brighter future

APS/User Monthly Operations Meeting

J. Murray Gibson

December 13, 2006



U.S. Department
of Energy



A U.S. Department of Energy laboratory
managed by The University of Chicago

Welcome

- What is the purpose of this meeting?
 - To let the APS/User community know the outcome of the Machine Advisory Committee meeting in November
 - *Slides and materials through the UPGRADE link on the APS web site*
 - *Report (on the web) contains a strong endorsement for the ERL path*
- Energy-recovery LINAC
 - 2-3 orders of magnitude reduction in emittance, almost fully coherent flux, intrinsically short pulses, relatively non-disruptive upgrade path
- This is an important step in the process of upgrade planning – we have narrowed the machine options to an ERL
- Today's focus is on the machine options and expected performance
- Next will come development of the strongest possible scientific case for which we rely heavily on our users
 - And recognize that our upgrade project will be probably our **best** opportunity for major new investments in beamlines – instrumentation, software and associated manpower

Agenda

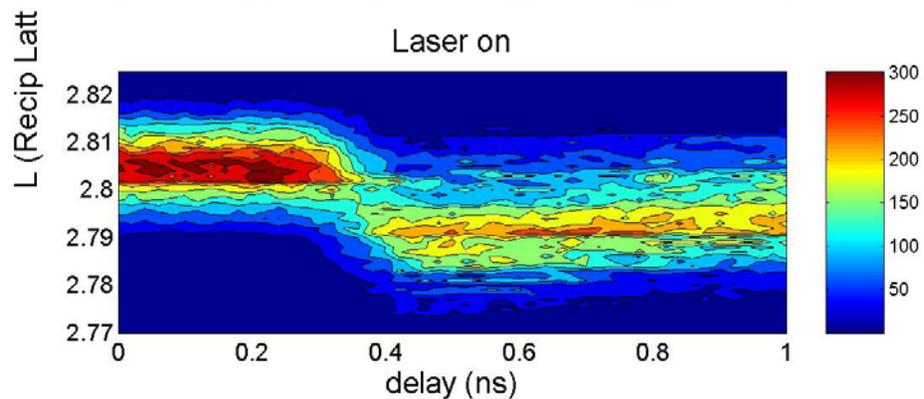
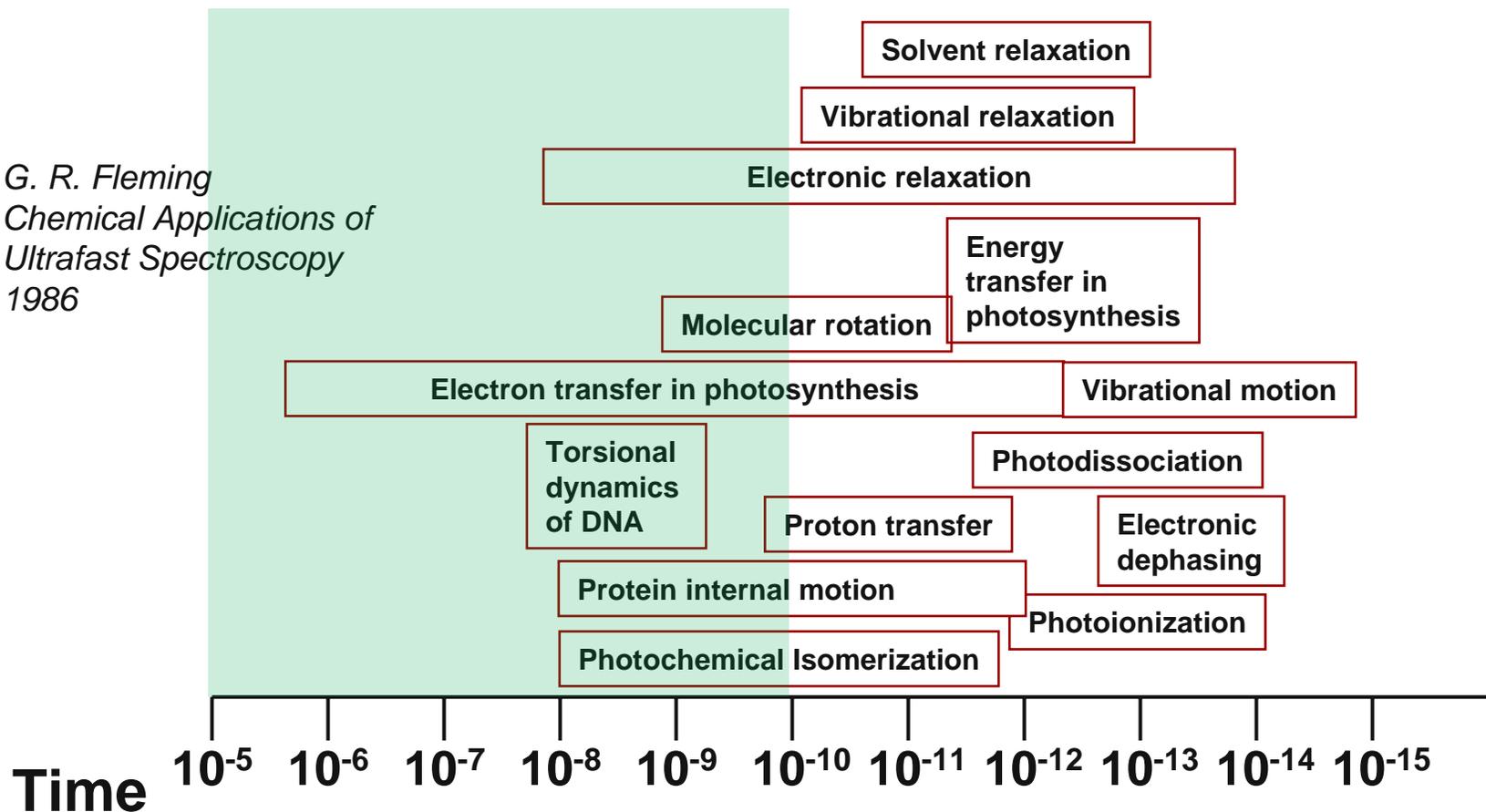
- 2:30 p.m. – Refreshments
- 2:45 p.m. – Welcome and MAC Report Summary –
Murray Gibson/Efim Gluskin
- 3:55 p.m. – ERL Infield Option – Nick Sereno
- 3:10 p.m. – ERL Outfield Option and
Supporting R&D – Michael Borland/Louis Emery
- 3:35 p.m. – Gun R&D – Kathy Harkay
- 3:45 p.m. – Where do we go from here? –
Murray Gibson
- 4:00 p.m. – Adjourn

And now?

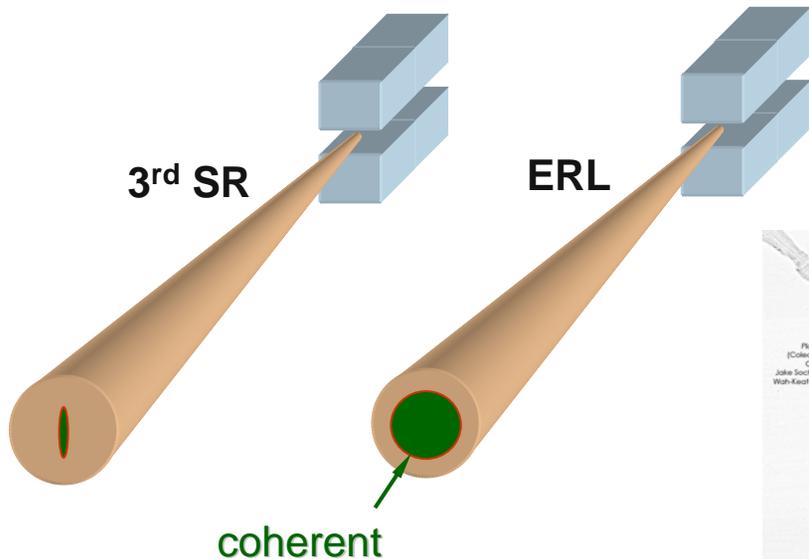
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ERL offers ultrashort pulses – 1ps and less

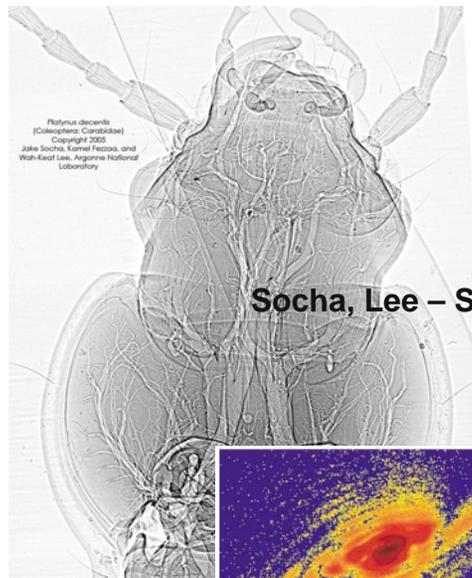
G. R. Fleming
*Chemical Applications of
Ultrafast Spectroscopy*
1986



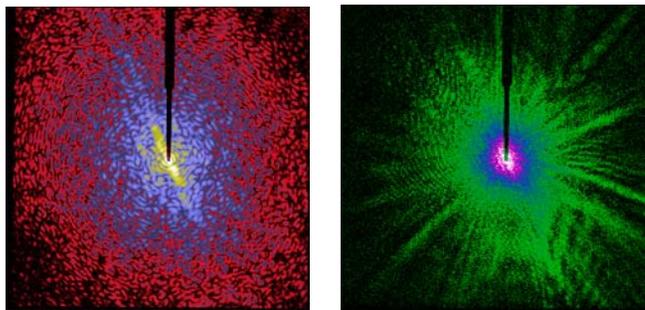
ERL: Ideal Source for Imaging !



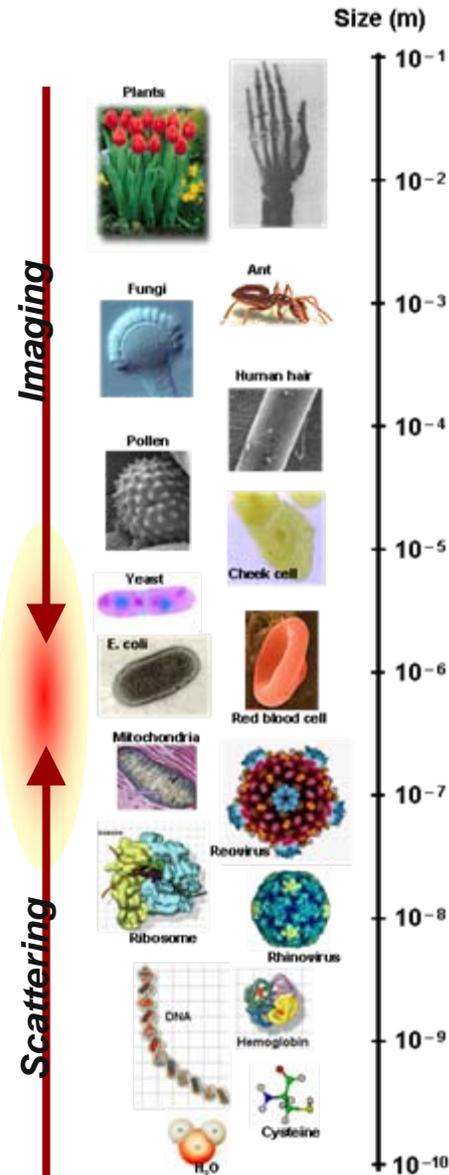
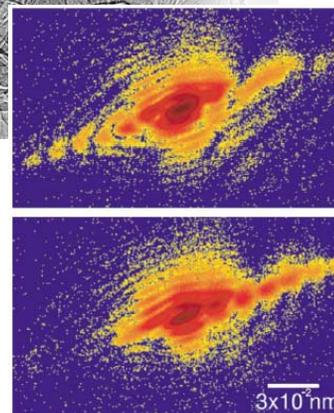
Shen, Hao, Gruner,
Physics Today
(March 2006)



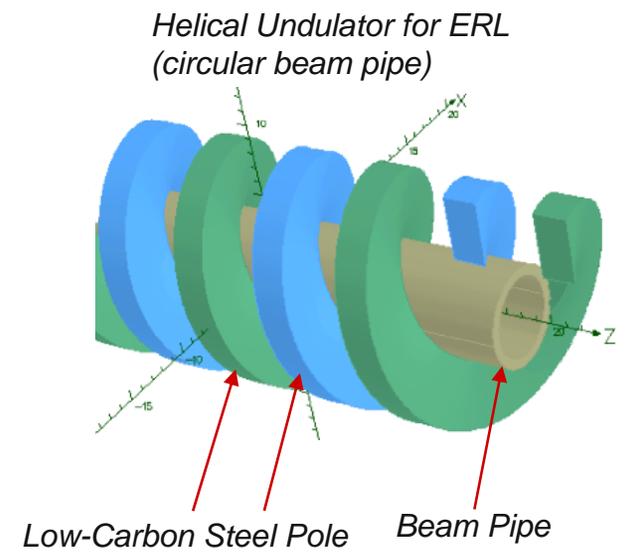
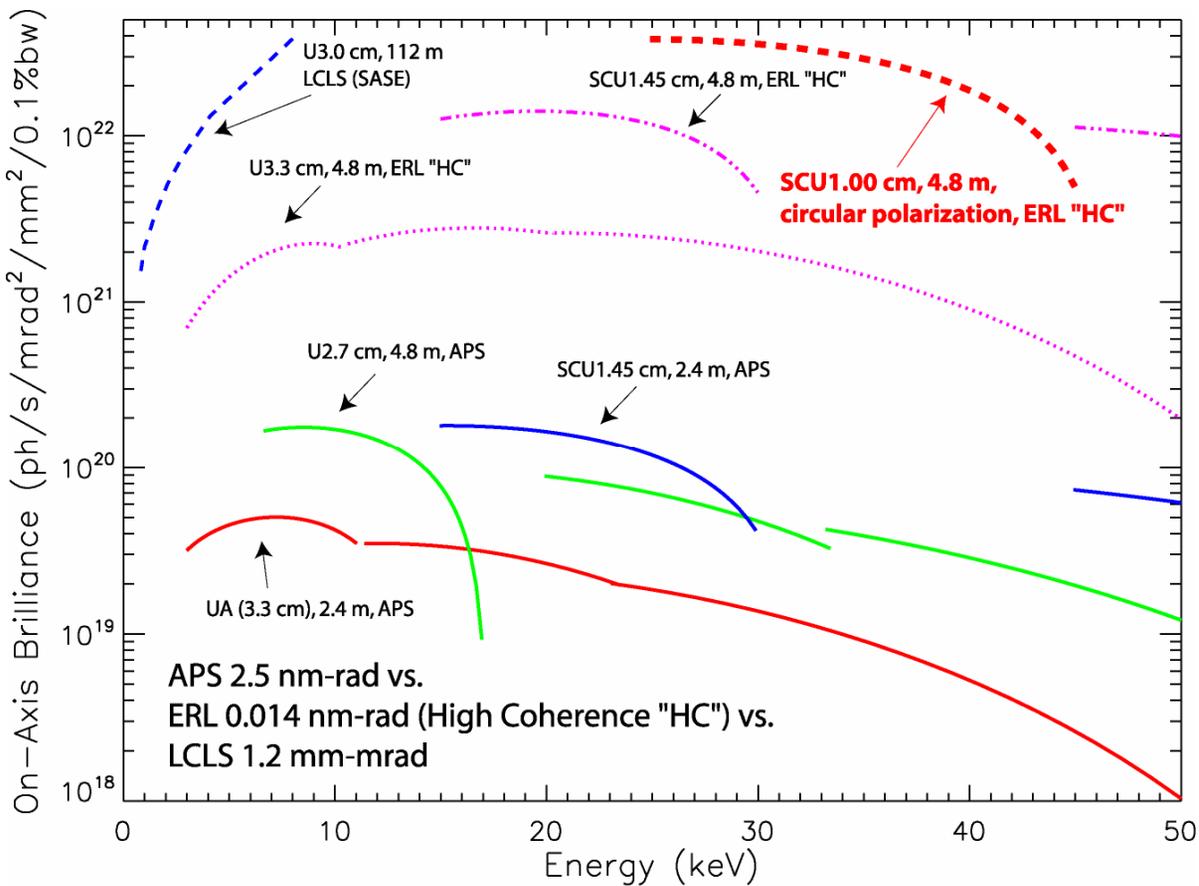
Socha, Lee – Sector 32



Miao – actin filaments, 2-ID-B



Helical undulator offers on-axis brilliance at high energies with an ERL



- Beam Energy 7.0 GeV (APS), 4.3 – 13.6 GeV (LCLS; Ref. H.-D. Nuhn)
- Beam Current 100 mA (APS), 25 mA (ERL High Coherence "HC")

Next Steps

- We will move forward with the ERL proposal
 - Including a machine upgrade, beamlines, detectors, optics and software
- Focus on scientific case, and design optimization
- Report from summer workshops due soon (George Srajer)
- SAC meeting, PUC, APSUO for further discussion of scientific case– January
- CMMP Facilities workshop on January 28th
- Technical design continuing – expect to write a “white paper” in ~February
- Specialized workshops in Spring (e.g. optics)
- APS User Meeting – major focus of workshops will be upgrade science
- Aim for proposal in the summer (2009-2010 funding start)

- PS - Have requested matching ~\$36M from State of Illinois for an Imaging Institute

- Understand that we must upgrade or face withering support in the next decade – ERL option is revolutionary and can be implemented while preserving today’s capabilities. Also, major upgrade construction project provides resources for many other essential investments in instrumentation, software and manpower which would be almost impossible to get any other way.
- Opportunity is good with bipartisan focus on doubling/tripling of DOE Science budget... but we need your help and engagement...