Extreme Light Missions and Challenges (An Ultrafast Tour)

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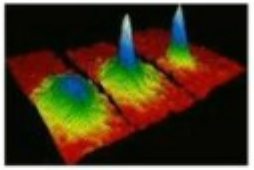
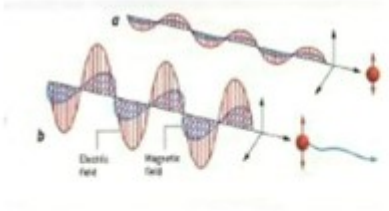
Laser Physics

Cold Atoms
feV-neV





Relativistic
Optics
GeV-TeV

2010 — 1eV — 2010

1960

Atomic, molecular and optical (AMO)Physics

- Atom Optics
- Quantum Optics
- Metrology
- Condensed-Matter Physics
- Quantum Information Science (Quantum Computer)
- Chemistry

Relativistic/ultraRelativistic Optics

Plasma physics

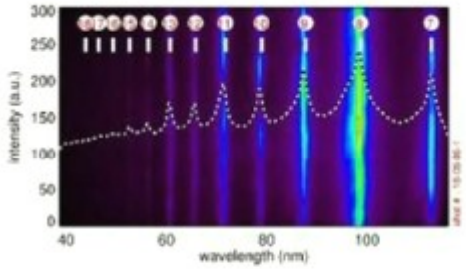
- Accelerator physics
- Nuclear Physics
- Cosmology
- NL QED
- General Relativity
- Extradimension physics

The plasma medium

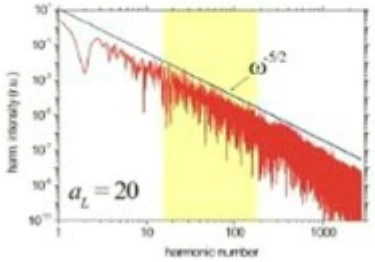
Bulanov *et al*, Phys. Plasmas **1** (1994)

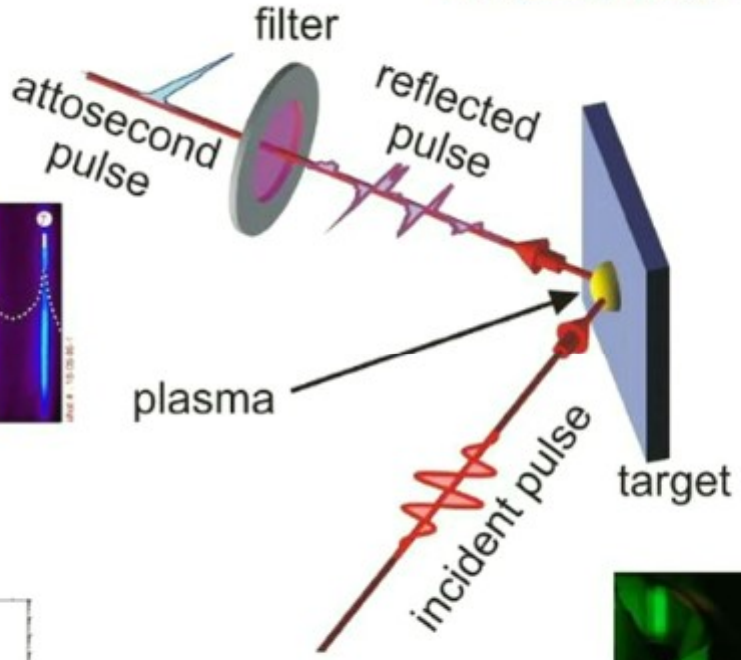
B. Dromey *et al.*, *Nat. Phys.*, 2, 456 (2006)
B. Dromey *et al.*, *PRL*, 99, 085001 (2007).
A. Tarasevitch *et al.*, *PRL*, 98, 103902 (2007)
Y. Nomura *et al.*, *Nat. Phys.* 5, 124 (2009)

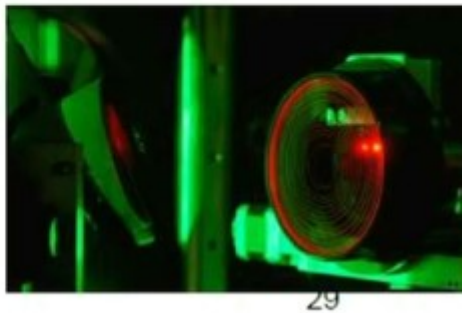
Surface plasma harmonics



Ιντροδυχτιον οφ α βανδ–παισσ φιλτερ ρεσυλτσ ιν αττοσεχονδ πυλσεσ







Testing Quantum Vacuum

The idea is to come with a laser intense enough to breakdown vacuum and observe its elements.