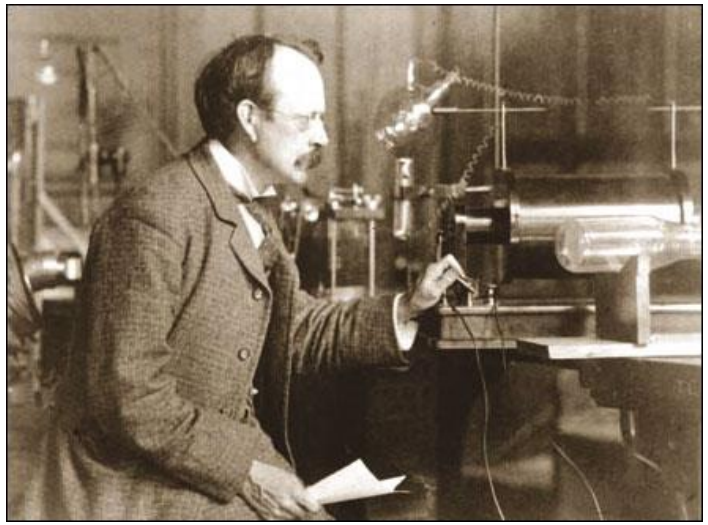
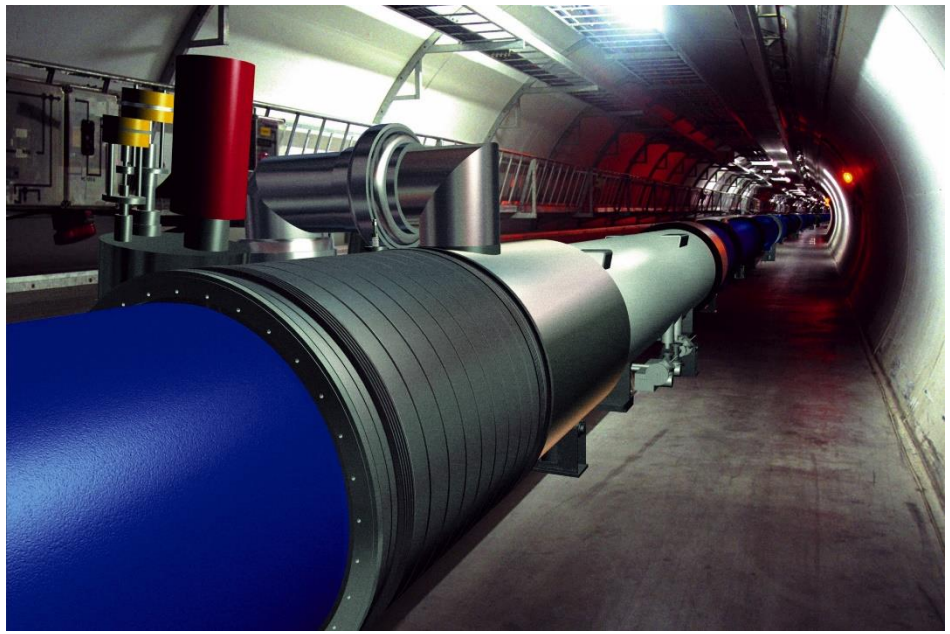
Concluding ELI-NP Autumn School 2022

ELI-NP Autumn School 2022
October 3-7, 2022
Bucharest-Magurele, Romania

In the 20th century
Fundamental Research has been carried out and dominated by the Particle-based Paradigm:
namely accelerator for Massive and Charged particles





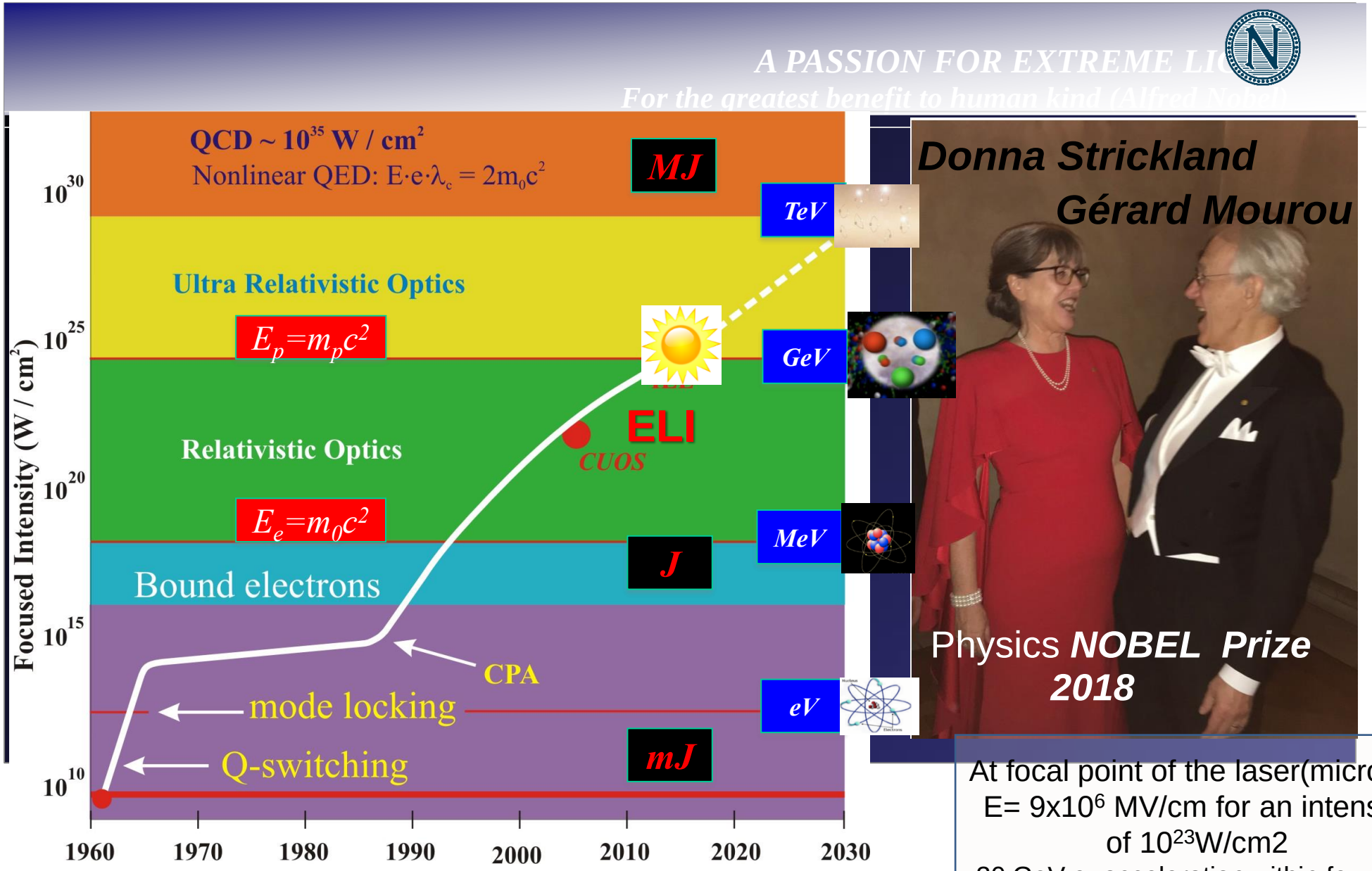
21st Century; the Photon Century
Could basic research be driven
by the massless and chargeless Photons??

Large Scale Lasers: Could they become the Next Large Scale Fondamental Research Infrastructures?

The First exemple is the Extreme Light Infrastructure ELI.

S.Gales for the ELI-NP team

Ultra High Intensity Laser "A revolution"



At focal point of the laser(microns) E= 9x10^6 MV/cm for an intensity of 10^{23}W/cm2

30 GeV e- acceleration within few mm

ELI: Extreme Light Infrastructure : A revolution in Laser technology

A PASSION FOR EXTREME LIGHT

For the greatest benefit to human kind (Alfred Nobel)

Giant wakefield acceleration in solid

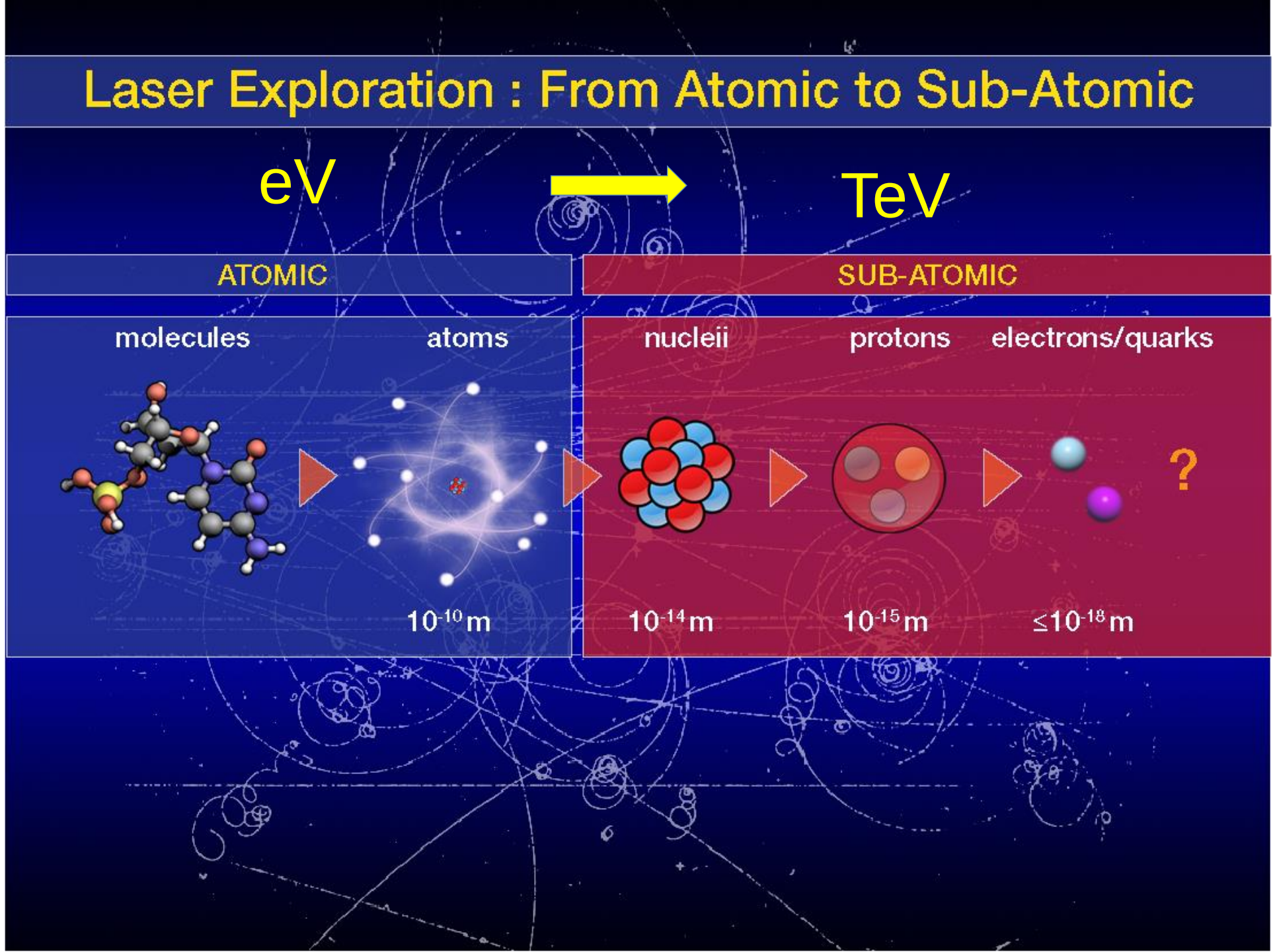
Tajima et Dawson (1979)

Laser-particle accelerations to the GeV/mm level become possible

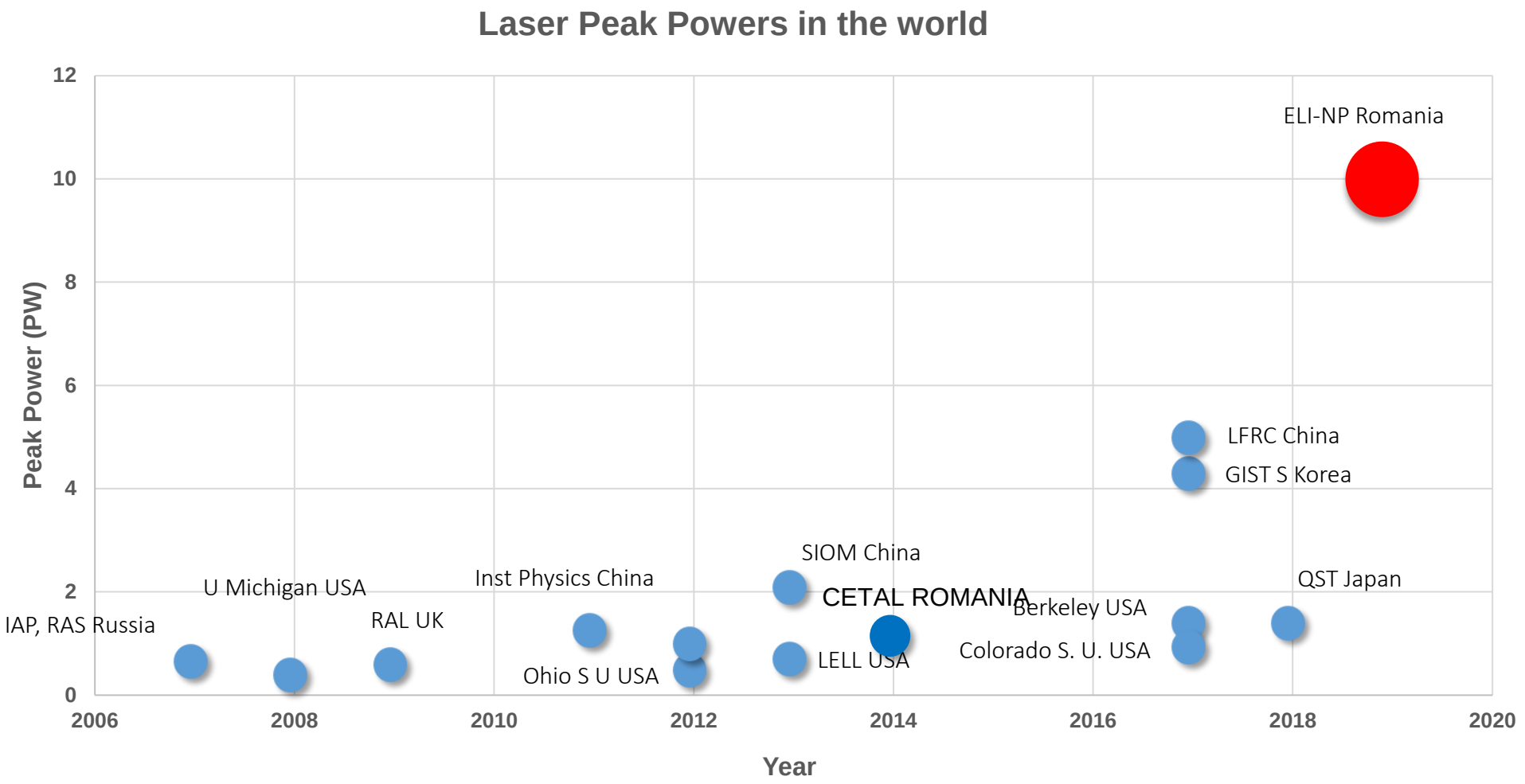
The Pressure of Light?
I = 10^{23} w/cm^2
10 millions Eiffel Towers on the tip of your finger!

1PW Extreme Light is 1000 times the world grid power in 10-15fs

Laser Exploration : From Atomic to Sub-Atomic

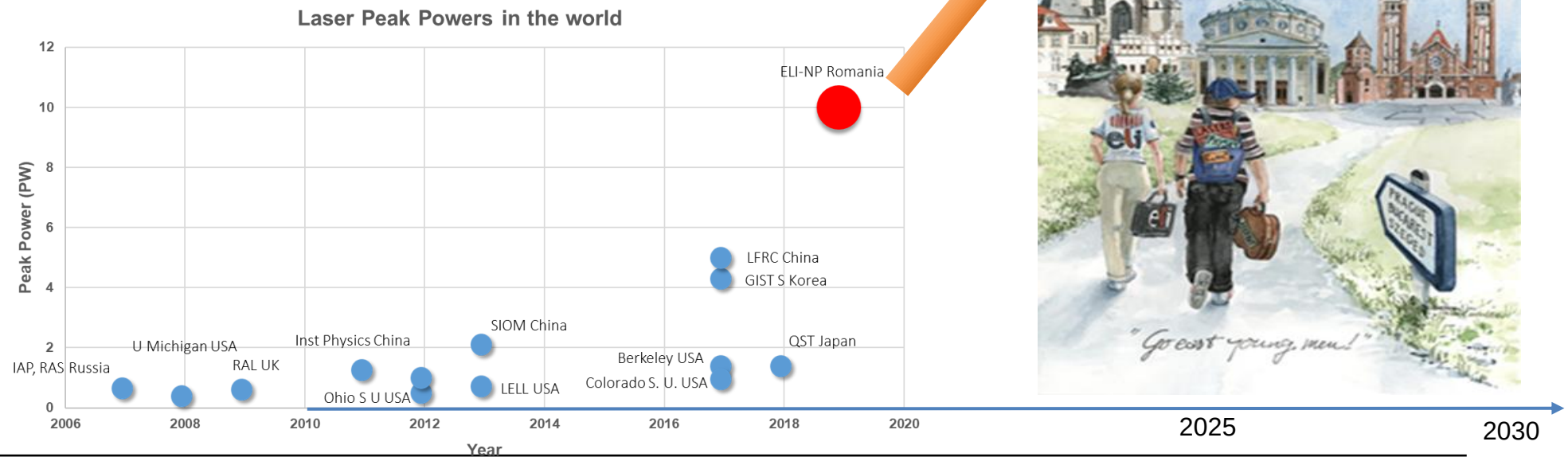


ELI-NP @ 10 PW


Laser Peak Powers in the world
Peak Power (PW)
Year
0
2
4
6
8
10
12
2006
2008
2010
2012
2014
2016
2018
2020
ELI-NP Romania
LFRC China
GIST S Korea
SIOM China
Inst Physics China
U Michigan USA
IAP, RAS Russia
RAL UK
CETAL ROMANIA
Berkeley USA
QST Japan
Colorado S. U. USA
LELL USA
Ohio S U USA

ELI-NP a place to be in the coming decade!

Europe has decided to build the highest intensity laser ELI For
Extreme Light Infrastructure



Topics & Lecturers

- ✓ Laser technologies and facilities
- ✓ Laser metrology
- ✓ High energy density physics and Inertial Confinement Fusion
- ✓ Laboratory astrophysics
- ✓ Laser driven ions acceleration
- ✓ Laser driven electron acceleration
- ✓ Strong field quantum electrodynamics
- ✓ Particle in cell simulations for laser-driven experiments
- ✓ Radiotherapy, FLASH effect and irradiated biomolecules

- Vincent BAGNOUD (GSI / TU Darmstadt, Germany)
- Eric CORMIER (University of Bordeaux, France)
- Razvan DABU (ELI-NP, Romania)
- Ioan DANCUS (ELI-NP, Romania)
- Emmanuel d'HUMIERES (University of Bordeaux, France)
- Domenico DORIA (ELI-NP, Romania)
- Andrea MACCHI (U Pisa, Italy)
- Paul McKENNA (U Strathclyde, UK)
- Vincenzo PATERA (U Sapienza, Roma, Italy)
- Ovidiu TESILEANU (ELI-NP, Romania)
- Vladimir TIKHONCHUK (ELI-Beamlines, Czech Republic)
- Paolo TOMASSINI (ELI-NP, Romania)
- Paul VASOS (ELI-NP, Romania)

Organizers

Chairs: Calin A. UR, Sydney GALES

Program Chair: Daniel URSESCU

School Secretaries: Alexandra CARLIG, Domnica NEAGU

Infrastructure:

- **Horatiu BAL**
- **Laurentiu SERBAN**
- **Mihai ISVERCEANU**
- **Silvian ZALUTCHI**
- **Mihail CIUBANCAN**
- **Gabriel BLEOTU**
- **… and the entire ELI-NP crew**

Competition best poster

Chloe Ho	Deuterons and Neutrons from Cryogenic Deuterium Ribbons at Vulcan Petawatt
Vicentiu Iancu	Qualification and Optimization of Helical Phase Pulses in PW-Class Laser Systems
Stefania-Cristina Ionescu	Nanowires targets by electrochemical synthesis for laser-matter interaction experiments
Katalin Kovács	High-harmonic generation in a strongly overdriven regime
Istvan Ferenc Toth	Fast amplitude and phase recovery of ultrashort laser pulses by deep neural networks
Ekaterina Starodubtseva	Phase space consideration of low energy electron injection for Direct Laser Acceleration
Alexei Zubarev	Study of metallic nanowires arrays behavior upon laser prepulse irradiation
Diana Gorlova	Transition radiation in the THz range generated in the relativistic laser—tape target interaction
Andreea Bianca Gherghe	Optimization and manufacture of the positron moderation device based on a magnetic bottle
Gabriel Petrisor BLEOTU	Methods to investigate the LIDT with femtosecond pulses at ELI-NP
Cosmina Viorela Nedelcu	Timing resolution of fast gamma detectors
Emanuela Boicu	Systematic study of first 2+ states in Calcium and Palladium isotopes using La Scale Shell Model
Dragos Nichita	Physics opportunities at the Gamma Factory
Anamaria Spataru	Shape phase transition at N=90 using high precision mass measurements at t FRS-IC
Alicja Kwaśny	Frequency-doubled femtosecond fiber laser source for multiphoton scanning laser microscopy
Mikołaj Krakowski	Mode-locking build-up dynamics in an all-PM femtosecond figure-nine Tm-doped fiber laser based on nonlinear amplifying loop mirror.
Alexandru Magureanu	Plasma imaging Diagnistics for high power laser experiments

Committee:

- Eric CORMIER (University of Bordeaux, France)
- Emmanuel d'HUMIERES (University of Bordeaux, France)
- Vladimir TIKHONCHUK (ELI-Beamlines, Czech Republic)
- Bogdan DIACONESCU (ELI-NP, Romania)
- Catalin MATEI (ELI-NP, Romania)

Poster prizes

Third prize

Alicja Kwaśny (Wrocław University of Science and Technology, Poland**)**

Frequency-doubled femtosecond fiber laser source for multiphoton scanning laser microscopy

Third prize

Diana Gorlova (M. V. Lomonosov Moscow State University, Russia**)**

Transition radiation in the THz range generated in the relativistic laser—tape target interaction

Second prize

Stefania-Cristina Ionescu (ELI-NP, Romania**)**

Nanowires targets by electrochemical synthesis for laser-matter interaction experiments

First prize

Gabriel Petrisor Bleotu (ELI-NP, Romania)

Methods to investigate the LIDT with femtosecond pulses at ELI-NP