

## Research Fellow Positions – Center for Relativistic Laser Science

Center for Relativistic Laser Science (CoReLS) of Institute for Basic Science (IBS) in Korea invites applicants with extraordinary talents for three research fellow positions. CoReLS was established to investigate novel physical phenomena in strong field physics with its PW lasers. CoReLS explores innovative physics in ultrahigh intensity laser-matter interactions, especially laser-driven electron and ion acceleration, laboratory astrophysics and strong field QED. CoReLS invites applicants for research fellow positions in the following areas:

### 1) Experimental laser-plasma physics

CoReLS has performed experiments on radiation pressure proton acceleration and laser wakefield electron acceleration, and has pursued strong field QED experiments, such as nonlinear Compton scattering and Breit-Wheeler pair production, and laboratory astrophysics using its 4 petawatt laser. The research responsibility includes executing advanced research in these areas with the PW laser. Applicant should have experience in one or more of the following research areas: laser plasma physics, laser-driven proton/ion/electron acceleration, and laboratory astrophysics.

### 2) High power laser optics

The laser group at CoReLS has developed and operated ultrahigh intensity 4 PW laser and 150 TW laser. The laser performance has been continuously upgraded and advanced laser techniques have been actively developed so as to provide unprecedented experimental conditions for users. The responsibility includes developing and executing advanced technologies of ultrahigh intensity lasers. Applicant should have experience in one or more of the following research areas: OPCPA, ultrafast laser, multi-pass amplifier, adaptive optics, and geometric optics, and nonlinear optics.

Prospective candidates are expected to have Ph.D. in laser-produced plasma, laboratory astrophysics, ultrashort high-power laser, or equivalent. Applicants with experience in ultrahigh intensity laser, superintense laser-matter interaction, or laser-driven particle acceleration are very much encouraged to apply. More information on CoReLS facility and research program is shown in the attached brochure. The annual salary starts from 52,200,000 won (about \$45,000), including the severance of one-month payment per year, and additionally a research incentive is given at the end of each year. In addition, IBS will pay a half of the medical insurance (national health plan) and a half of the national pension plan, and the full coverage of the accident insurance during work and the unemployment insurance.

Further inquiry can be made by e-mail to [corels@ibs.re.kr](mailto:corels@ibs.re.kr).

Applicants may send resume, publication list, and names of three references by e-mail to [corels@ibs.re.kr](mailto:corels@ibs.re.kr) by July 31, 2019\*.

\*The application deadline can be extended until the required positions are filled.



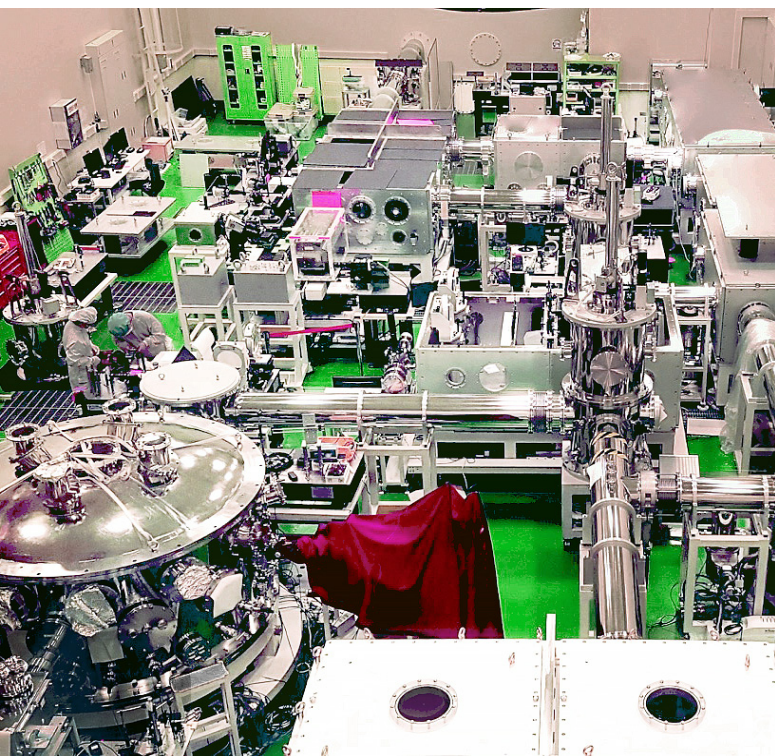
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# Center for Relativistic Laser Science



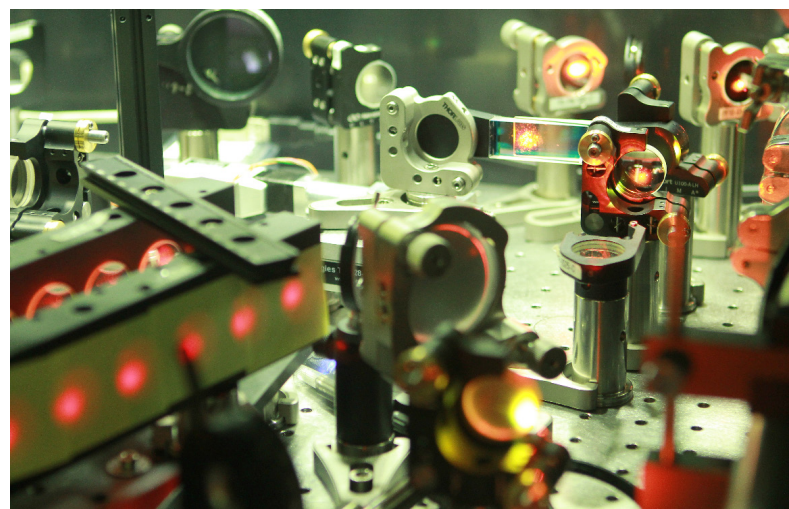
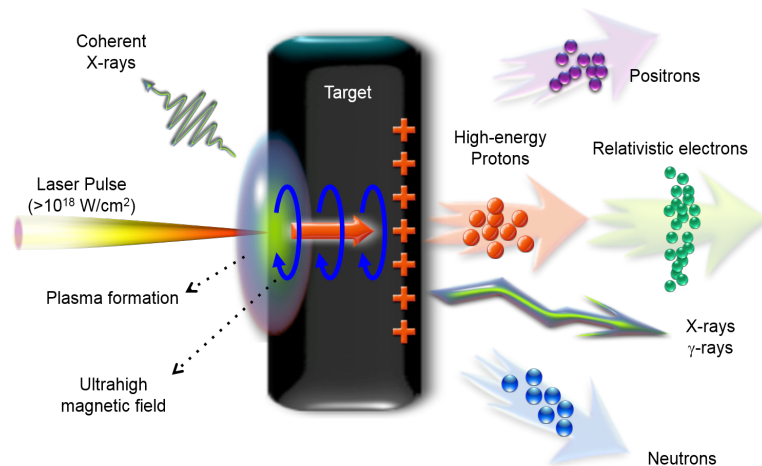
## The Center for Relativistic Laser Science (CoReLS) of Institute for Basic Science

(IBS) was launched in December 2012 based on the femtosecond (fs), petawatt (PW) laser facility, located at Gwangju Institute of Science and Technology (GIST), with two PW laser beamlines. CoReLS has upgraded one of the PW laser beamlines to a 4 PW laser in 2016, as a part of ultrahigh intensity laser development.

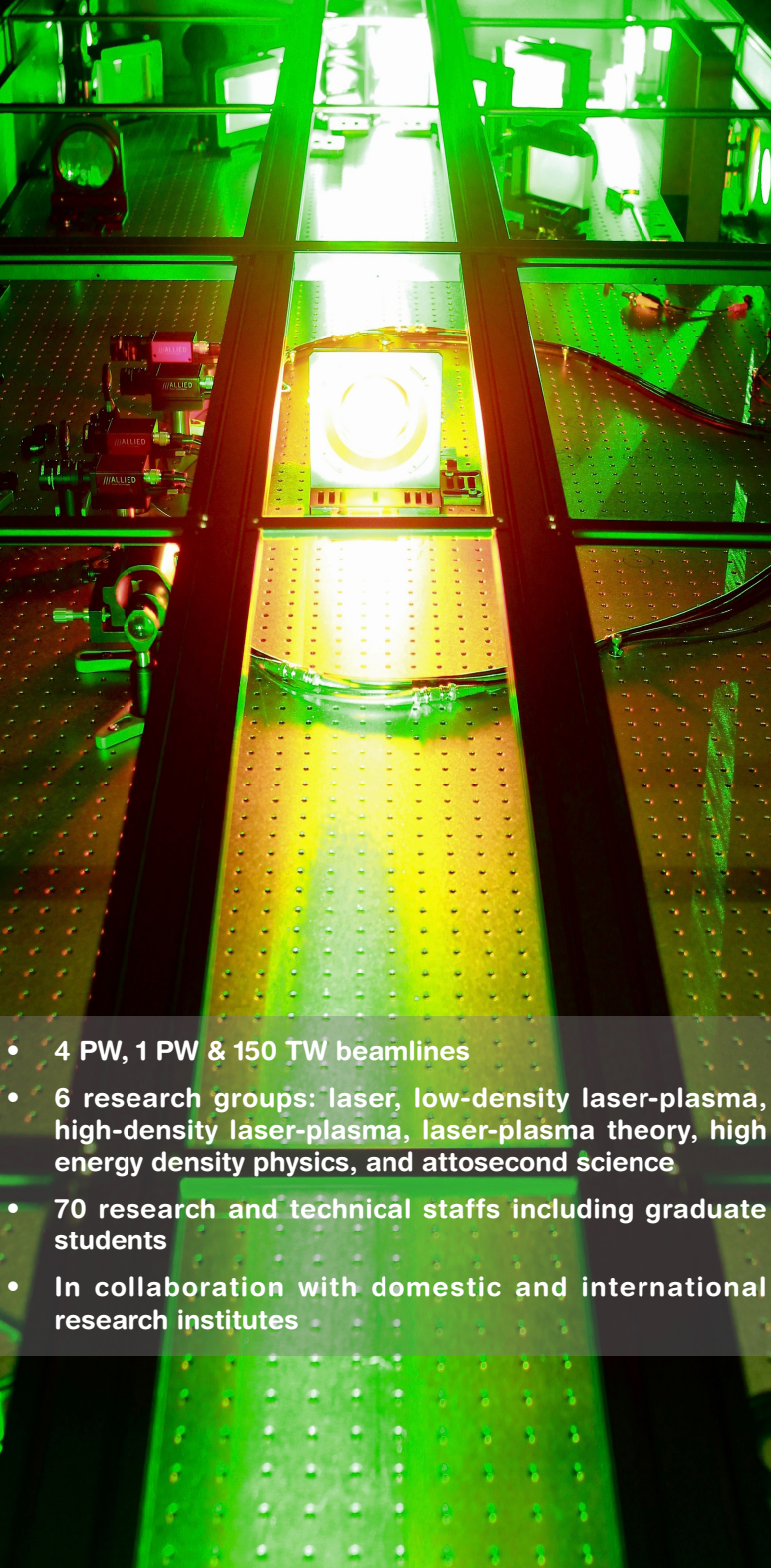
The research programs at CoReLS cover the areas in physics of laser-produced plasmas, strong field physics, laboratory astrophysics, nuclear photonics and attosecond science. With 4 PW laser, CoReLS has been exploring novel physical phenomena in:

- Superintense laser-matter interactions, including laser-driven electron/proton acceleration and gamma-ray generation from Compton backscattering.
- Astrophysical processes of magnetic reconnection, shock acceleration and cosmic ray generation.
- Strong field quantum electrodynamics processes occurring in the interactions of photon-electron and photon-photon.

## Laser-Matter Interactions and Related Phenomena Explored at Relativistic Laser Intensities







- 4 PW, 1 PW & 150 TW beamlines
- 6 research groups: laser, low-density laser-plasma, high-density laser-plasma, laser-plasma theory, high energy density physics, and attosecond science
- 70 research and technical staffs including graduate students
- In collaboration with domestic and international research institutes

## Primary Research Areas

### Development of Ultrashort High Power Lasers

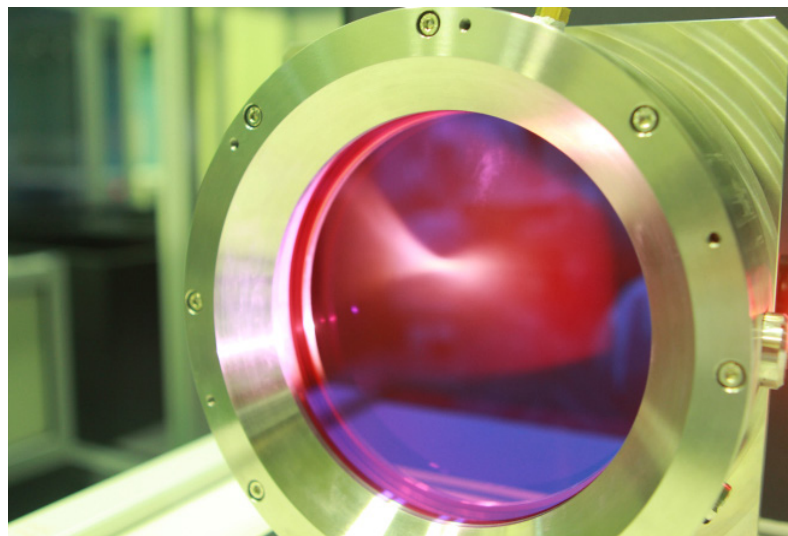
- Ultrahigh intensity multi-PW lasers
- Control of spatial and spectral phase profiles of lasers
- Generation and characterization of few-cycle light pulses

### Investigation of Laser-Matter Interactions in the Relativistic Regime

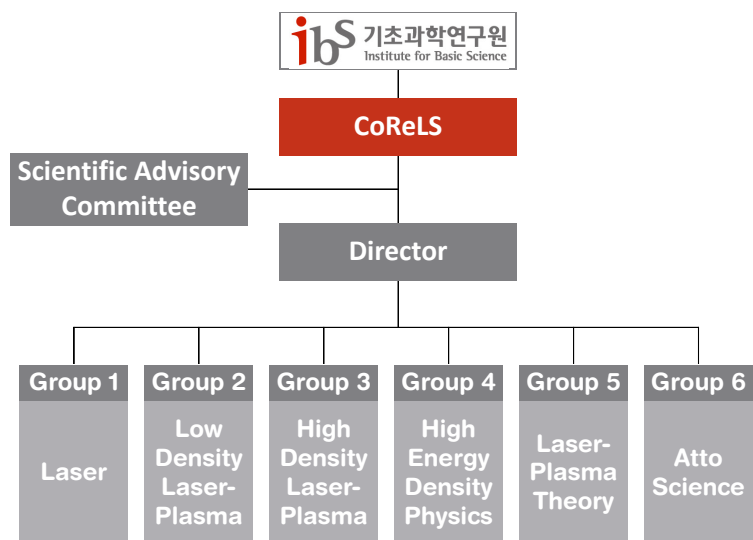
- Generation and application of laser-driven energetic particles
- Production of ultrashort light sources (extreme ultraviolet, x-ray, gamma rays)
- Physics in high energy density environment
- Laboratory astrophysics
- Theoretical analysis of laser-plasma interactions

### Study of Physical Phenomena under Extreme Spatio-Temporal Condition

- Generation and characterization of attosecond ( $10^{-18}$  s) and zeptosecond ( $10^{-21}$  s) light sources
- Complete characterization of attosecond pulses
- Ultrafast phenomena in atoms, molecules, and solids including nanostructure materials



## Organization



## Laser Specification

Ti:Sapphire PW Lasers			
Beamlines	Pulse Duration	Repetition Rate	Contrast Ratio
(I) 4 PW	20 fs	0.1 Hz	$<10^{-12}$
(II) 1 PW			
(III) 150 TW	25 fs	5 Hz	$10^{-8}$



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