



Quest for Strong Field Physics Research with a multi-PW Laser

Date: February 9 (Wednesday) Time: 10:00 a.m. Zoom Online Lecture: https://bit.ly/3nDs5it Meeting ID: 988 0150 1062 Password: 2859

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Abstract:

Ever since the Nobel Prize winning invention of the chirped pulse amplification technique in 1985, ultrashort high power lasers have been developed and applied to strong field physics research. At Center for Relativistic Laser Science (CoReLS), ultrahigh power lasers have been developed for the investigations of relativistic laser-matter interactions, laser-driven charged particle acceleration, laboratory astrophysics, and strong field quantum electrodynamics. CoReLS has upgraded its PW laser beamline to a 4PW laser in 2017 [1] and achieved the record-breaking laser intensity of 10²³ W/cm² in 2021 [2]. By applying the laser wakefield acceleration, we have produced multi-GeV electrons and used them for exploring nonlinear Compton scattering for the research of strong field quantum electrodynamics (QED) phenomena, predicted to occur in astrophysical objects, such as supernova, magnetar and black hole. In this presentation, after introducing the basic principle and optical structure of the CoReLS PW laser, the strong field research program at CoReLS will be explained.

[1] J. H. Sung, H. W. Lee, J. Y. Yoo, J. W. Youn, C. W. Lee, J. M. Yang, Y. J. Son, Y. H. Chang, S. K. Lee, and C. H. Nam, "4.2 PW, 20 fs Ti:Sapphire Laser at 0.1 Hz," Opt. Lett. 42, 2058 (2017).

[2] J. W. Yoon, Y. G. Kim, I. W. Choi, J. H. Sung, H. W. Lee, S. K. Lee, and C. H. Nam, "Realization of laser intensity over 10²³ W/cm²," Optica 8, 630-635 (2021).

Biography:

Chang Hee Nam received his Ph. D. in plasma physics from Princeton University in 1988. After working at Princeton Plasma Physics Laboratory as a staff research physicist until 1989, he joined Korea Advanced Institute of Science and Technology (KAIST) as a faculty member and became a full professor in 1998. He started the Coherent X-ray Research Center in 1999 with the funding from the Ministry of Science and Technology through the Creative Research Initiative Program. After finishing the CXRC program in 2012, he launched the Center for Relativistic Laser Science (CoReLS), a research center of Institute for Basic Science (IBS), for the exploration of relativistic laser-matter interactions using femtosecond PW lasers at Gwangju Institute of Science and Technology (GIST). He has received several awards including the scientist-of-the-month award from the Ministry of Science and Technology Merit from the Korean Government. He has served the scientific advisory committees of ELI - ALPS in Hungary, ELI-NP in Romania, and also Int. Science and Technology Advisory Committee of ELI-DC. He is a fellow of the American Physical Society and of the Optical Society of America.

Anyone interested is welcome to attend!

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