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Development of a new ultra-high contrast module at PHELIX

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Since the implementation of the ultrafast optical parametric amplifier [1,2] (uOPA) as first amplifier within the frontend of the PHELIX laser system, which enables operation at extremely low ASElevels, the high-contrast operation mode has become the most favorable one for users at the PHELIX system.

Nonetheless, aside from the ASE-contrast, there is still lots of space for improvement concerning the lasercontrast in general. Especially the appearance of pre-pulses, spreaded over a timescale of few nanoseconds around the main-pulse [3], is still a challenging issue.

To overcome this problem, an ultra-high contrast module is being developed in the context of the ATHENAproject, which will act as the first amplifier at the PHELIX- and also at the PENELOPEfrontend. Using this novel module will allow the removement of pre-pulse-generating amplifiers and even further enhance the ASE-contrast by2-3 orders of magnitude.

On this poster, we will present the the design, goals and current status of the module-development.

[1] Dorrer, C., et al. "High-contrast optical-parametric amplifier as a front end of high-power laser systems." Optics letters 32.15 (2007): 2143-2145.

[2] Wagner, F., et al. "Temporal contrast control at the PHELIX petawatt laser facility by means of tunable subpicosecond optical parametric amplification." Applied Physics B 116.2 (2014): 429-435.

[3] V. A. Schanz, C. Brabetz, D. J. Posor, M. Roth, V. Bagnoud, High dynamic range, large temporal domain laser pulse measurement, Appl. Phys. B 125.61 (2019)

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