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## Concepts for High Average Power Ti:Sa Pulse Compressors

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With the development of kW-level average power Ti:Sapphire laser, thermal management becomes increasingly challenging. One key component, which currently limits the scaling towards higher average powers, is the final pulse compressor. Compressor gratings that provide sufficient spectral bandwidth to support few-10 femtosecond pulses –as required by many applications –are typically gold-coated. However, it is well-known that this final gold layer absorbs several percent of the incident laser energy, which then subsequently heats and deforms the grating substrate. The heat-induced deformation of the grating can severely degrade the spatio-temporal pulse quality [1] with dramatic consequences for applications such as laser-plasma acceleration.

Here, we discuss different concepts for compressor gratings, such as actively cooled gratings [2] and multi-layer dielectric gratings [3],[4] and their suitability as compressor gratings for the future KALDERA laser [5] at DESY.

### References

- [1] V. Leroux et al., Opt. Express 26, 13061 (2018)
- [2] D. A. Alessi et al., Opt. Express 24, 30015 (2016)
- [3] D. A. Alessi et al., Optics and Laser Technology 117, 239 (2019)
- [4] T. Erdogan, PGL Tech. Note (2018)
- [5] <https://kaldera.desy.de/>

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