

Accelerator-based Technologies

SPACED

Spectral Phase Analysis by Coordinate Encoded Dispersion

Technology

SPACED represents an optical diagnostic for the determination of the spectral phase and intensity of ultrashort laser pulses in the low femtosecond regime. This is achieved by the targeted manipulation of the spatial phase. The parenting method has been described in the literature as dispersion-scan (or d-scan), whilst SPACED does not require scans and can operate in the single-shot mode. The diagnostic is capable of competing with already established systems in terms of mobility, user friendliness and analysis-velocity. In comparison to these systems can the SPACED-diagnostic revoke the temporal ambiguity of ultrashort pulses and clearly determines their temporal orientation.

Innovation

The new SPACED-method combines a new physical concept with the technical demand to be better in the field of the temporal unambiguity, to show a higher level of user-friendly operation, to be simpler and financially convenient than comparable systems whilst maintaining the standard of reliable pulse measurements. In combination with the developer know-how, the retrieval algorithm and easily accessible optical components, this system can quickly be realised in every lab across the world and supplied to customers as transportable diagnostic for commissioning or system installations.

— INNOVATION &
TECHNOLOGIE
TRANSFER —



Challenges

Since the invention of ultrashort laser pulses, the reliable and accurate characterisation of these has been one of the most ambitious subjects in laser physics. As in most laboratories the standard method is to measure only the intensity of the laser, missing the information of the spectral phase which is encoded in the spectrum for a full characterisation of the pulse duration.

Until now, most commercial diagnostics for the characterisation of ultrashort laser pulses were not clear about the determination of the pulse orientation which property can be a crucial parameter which requires monitoring and controlling. Additionally, other systems rely on the recording of the indistinguishability of multiple laser pulses for a single measurement which only leads to an average over a pulse train and does not provide results for a single pulse.

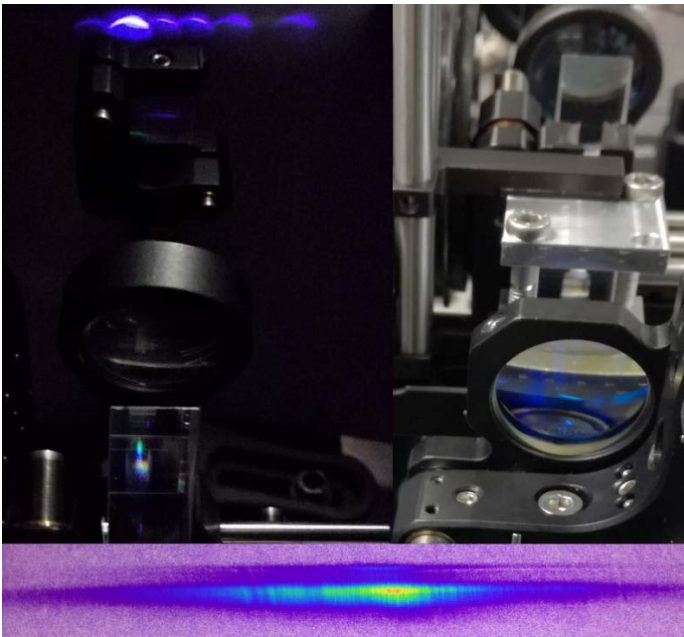
Advantages

- Single-shot device
- No temporal ambiguity present
- Robust, transportable diagnostic
- Simple optical setup
- Low-cost components

Software in Python

Application fields

The SPACED-diagnostics is suitable in every field in which high temporal resolution of laser pulses is essential. For instance in the laser system development, thus the commercial manufacturing of ultrashort pulse lasers as well as in the application in industry, for material processing, medicine or spectroscopy. In research, the principle finds its benefit exemplary in the investigation of the influence of matter on the temporal properties of lasers.



Industrial Sector

- Commercial short pulse laser system development.
- Laser applications in:
Industry/R&D
Material processing, Spectroscopy,
Medicine or Laser-Matter-Interaction
experiments

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