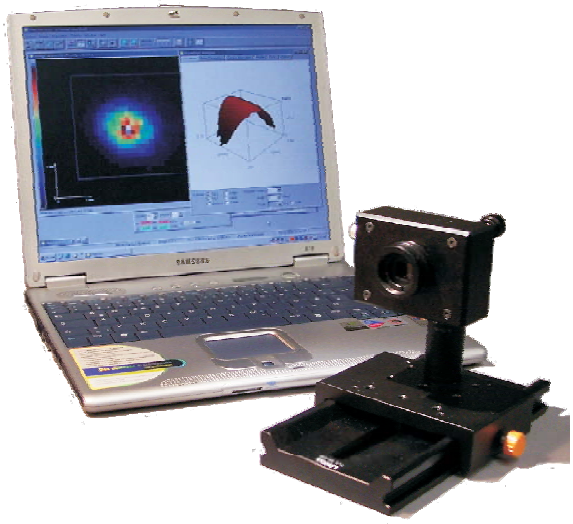
Laser Beam Profiler

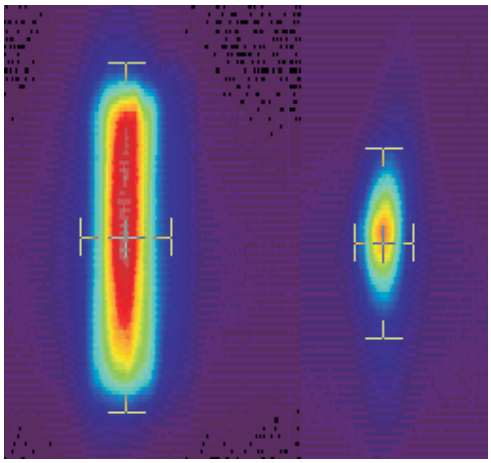
The **Laser Beam Profiler** provides high resolution real-time monitoring and quantitative characterization of spatial beam intensity distributions. Primarily designed for excimer lasers, it may be utilized for all pulsed or cw lasers as well as for incoherent sources, covering an extremely wide spectral range from NIR to soft X-rays. The UV/EUV sensitivity is achieved by a quantum conversion coating on the CCD chip.
A variety of different sensor types (large /small area, highest spatial resolution, sensitivity and dynamic range) are available and can be adapted to specific applications. The software supports also peripheric devices like adaptive mirrors, stepper motors, attenuators, shutters or power monitors. Automated ore remote-controlled measurements are facilitated by the help of a powerful macro language.

The applications comprise:
- *determination of beam parameters according to ISO 11146*
- *diagnosis of pointing stability (ISO 11670)*
- *pulse-to-pulse fluctuations*
- *beam propagation analysis (caustic measurement)*
- *Characterization of beam shape (uniformity, steepness) according to ISO 13694 (especially for homogenized beams)*
- *on-line laser beam inspection (e.g. recognition of "hot spots")*
- *optimizing of laser operational parameters*



Special Features:

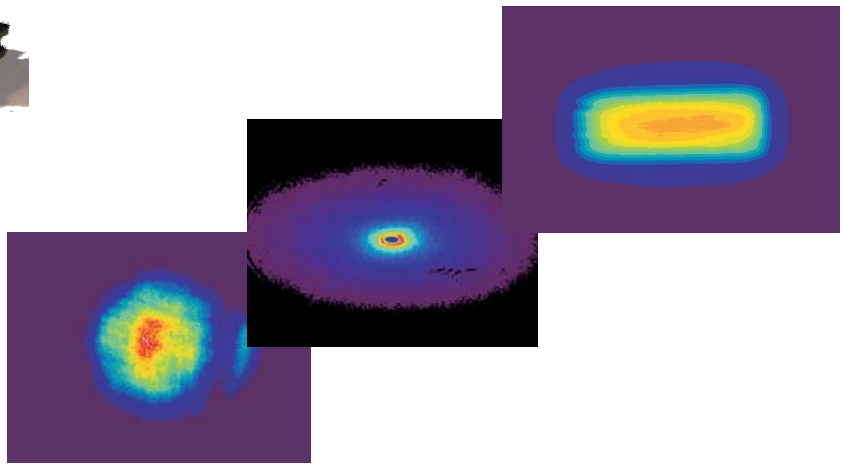
- wide spectral range: 1064 ... 13 nm
- small and large area CCD sensors
- USB 2.0 interface (ideal for laptop)
- high dynamic range (12 / 14 bit)



Near-field and far-field profile of ArF excimer laser (193nm), indicating 2nd moment beam widths

Applications:

- **Beam diagnostics (NIR, Vis, UV, EUV)**
- **ISO beam parameters**
- **Beam propagation / focusability**
- **M^2 (caustic measurement)**



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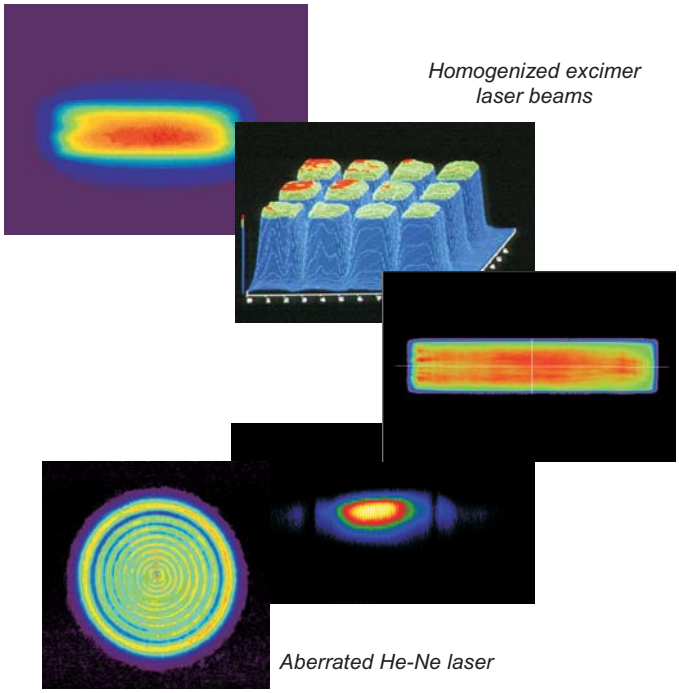
Laser Beam Characterization

Beam parameters:

Quantitative determination of all relevant laser beam parameters from the acquired profiles is achieved with the help of the comprehensive beam characterization software ‘MrBeam’, which makes use of standard ISO evaluation procedures.

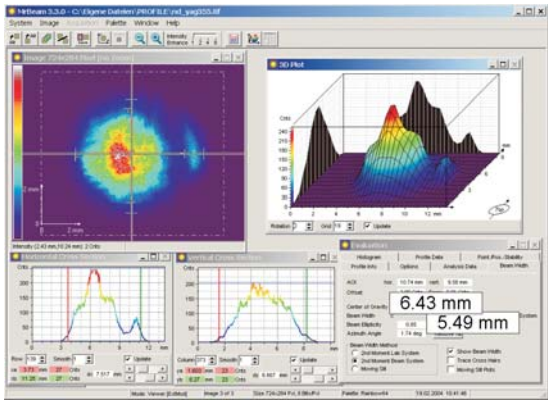
Beam parameters according ISO standards:

- beam width (2nd moment **(ISO 11146)**
- divergence, M² (with caustic setup; **ISO 11146)**
- pointing stabilitiy **(ISO 11670)**
- beam shape / uniformity **(ISO 13694)**

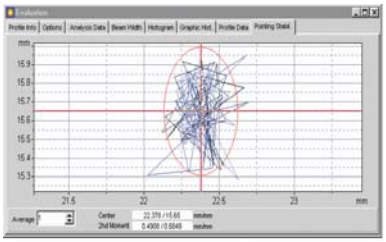


Homogenized excimer laser beams

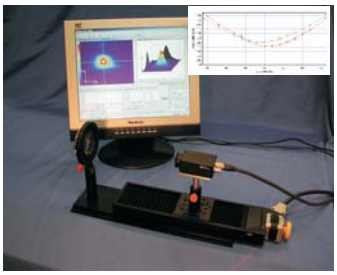
Aberrated He-Ne laser



Nd:YAG laser profile



Measurement of pointing stability



Caustic measurement (M², divergence)

Software:

- Various acquisition modes: *´grab´, ´averaging´, ´floating average´*
- evaluation of beam parameters:
  beam width (2nd moment, centroid, ellipticity, uniformity, relative pulse energy, pointing stability etc.
- 2D profile arithmetics (ADD, SUB, MULT, DIV etc.)
- selection of *area-of-interest* for analytic beam evaluations
- real-time display and evaluation of cross-sections, 3D graphics
- profile-fit (*Gaussian, super-Gaussian, top-hat etc.*)
- colour palettes incl. analytic functions (e.g. *´intensity threshold´*)
- easy-to-use ‘zoom’-functions
- comprehensive user-programmable macro language
- export of all data and profiles

The system includes:

- Digital camera (USB 2.0 interface for note-book or PC)
- Beam analysis software

Optional extensions:

- translation stage (e.g. for caustic measurement)
- Hartmann-Shack wavefront sensor
- adaptive mirror for closed-loop beam stabilization
- trigger / delay generator

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