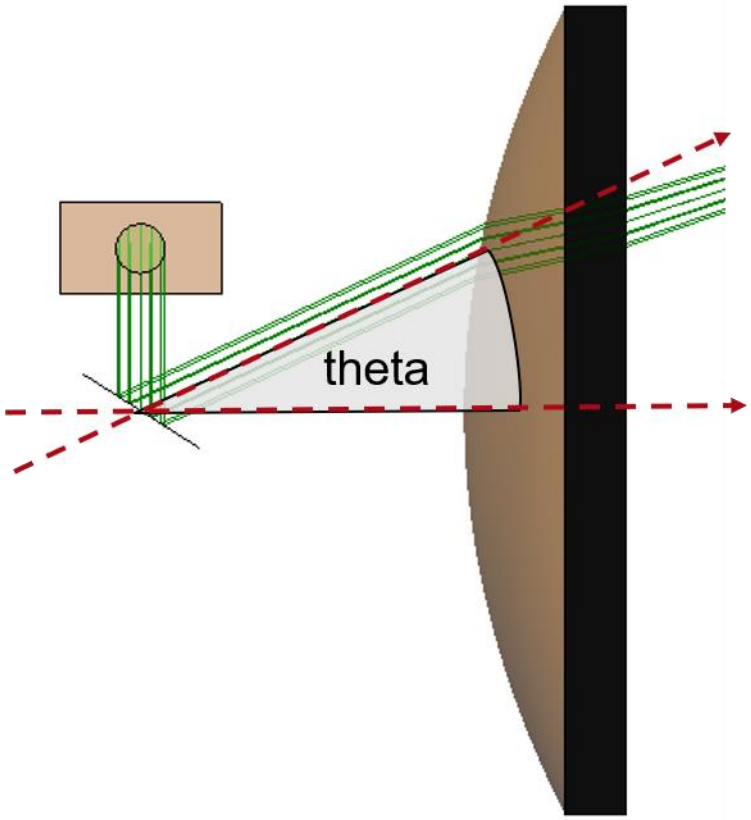
Performance Analysis of Laser Scanning System

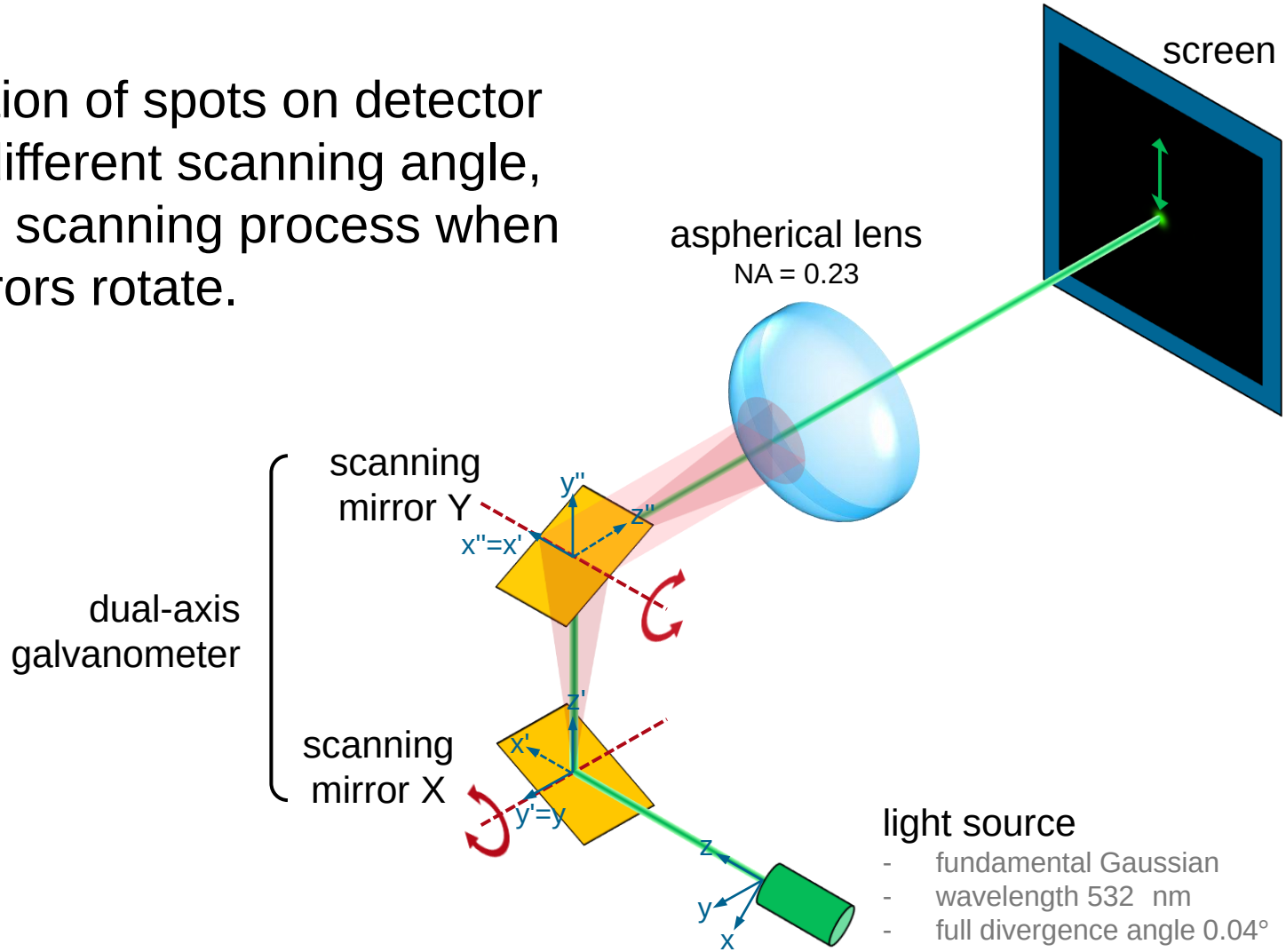
Abstract



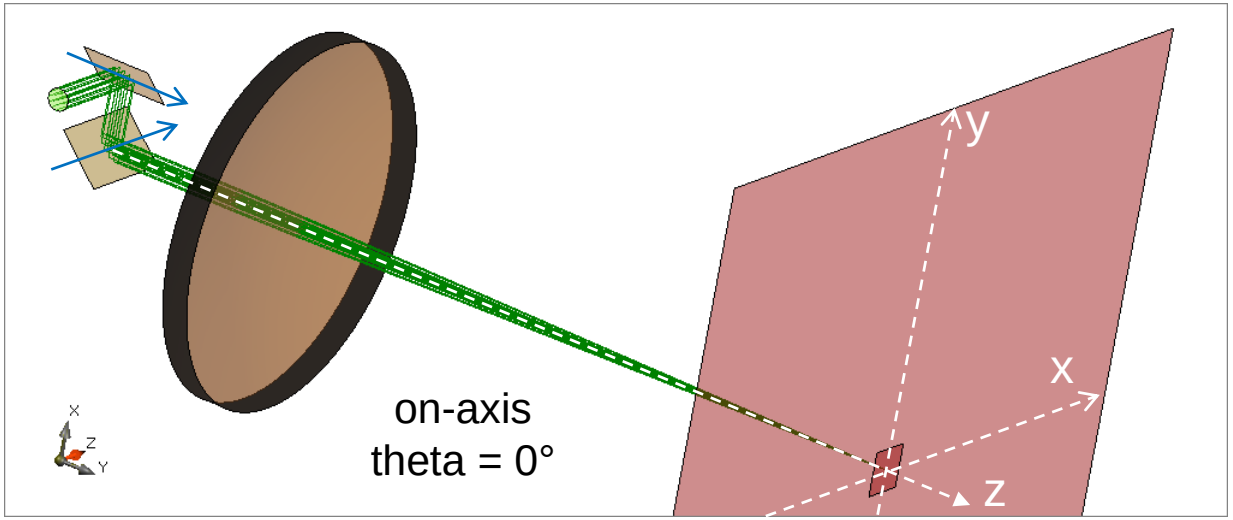
Laser scanning systems, with the help of e.g. a galvanometer, is capable of deflecting laser beams into predefined directions. And, in combination with focusing optics, such systems are often used for precise laser material processing. A scanning system consisting a dual-axis galvanometer and an aspherial focusing lens is modeled in VirtualLab. The rotation of the mirrors are modeled as in the practical case, and the focused laser spot at different scanning angles are examined.

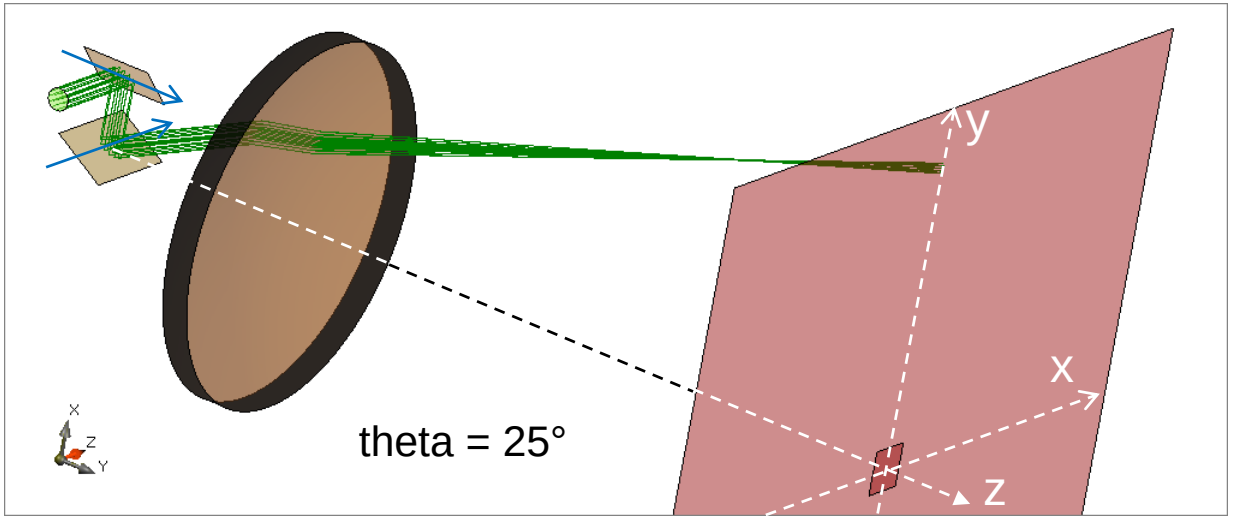
Modeling Task

Simulation of spots on detector under different scanning angle, and the scanning process when the mirrors rotate.

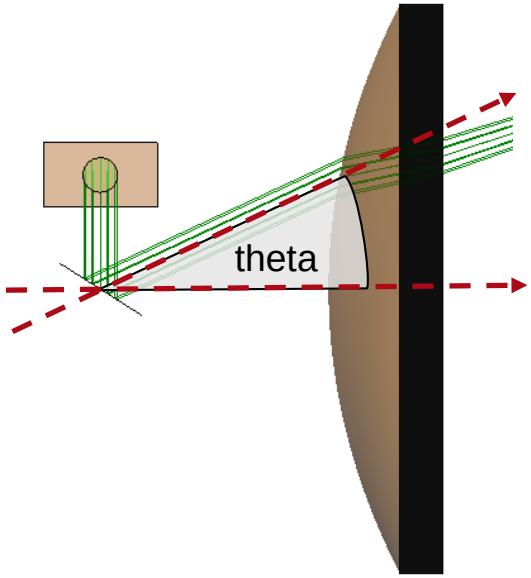


Results

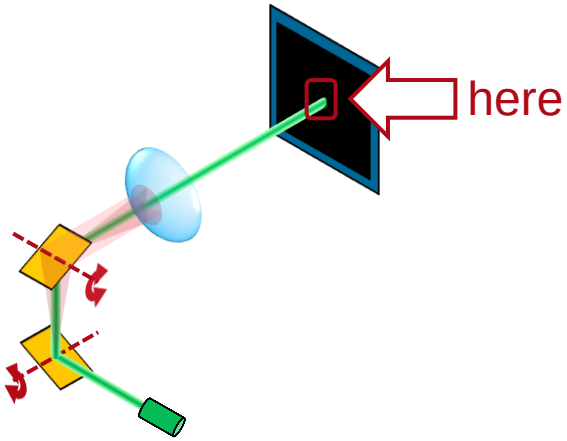




Ray-tracing analysis gives a fast access to 3D view of the complete system.

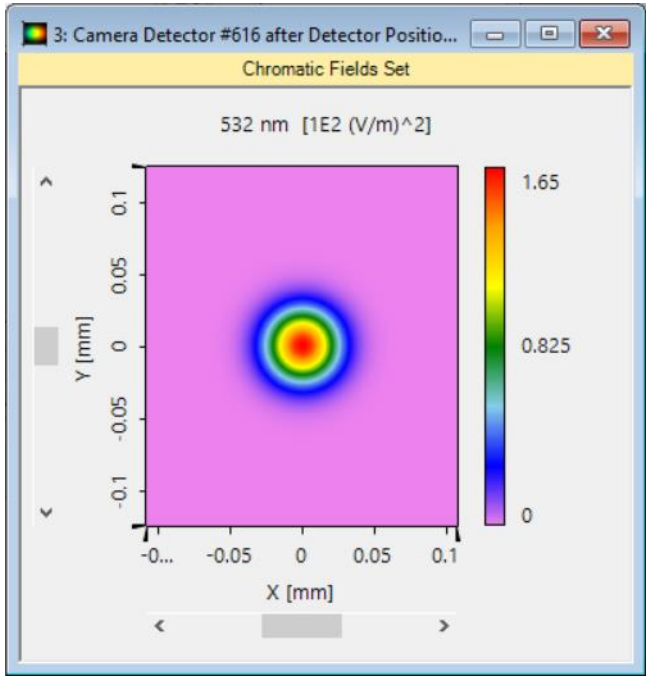


Results



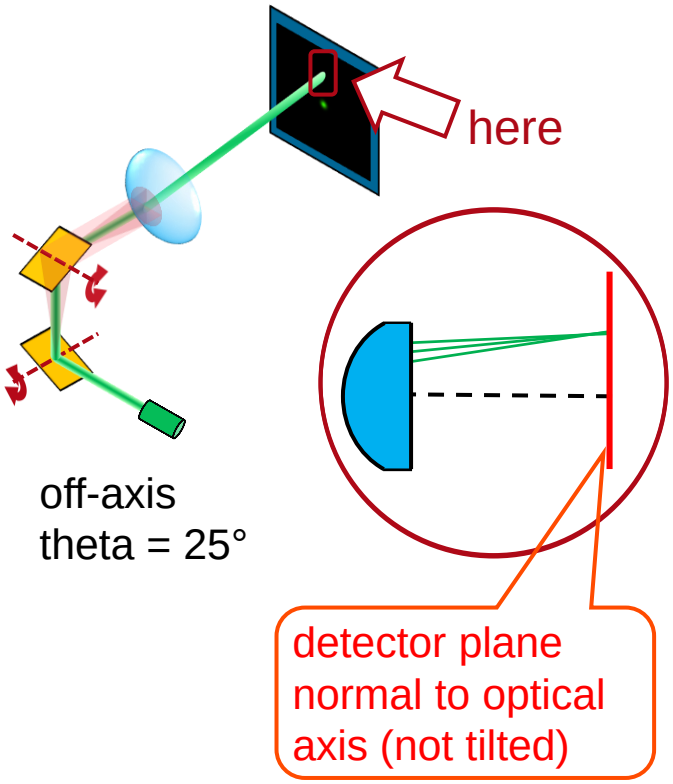
on-axis
theta = 0°

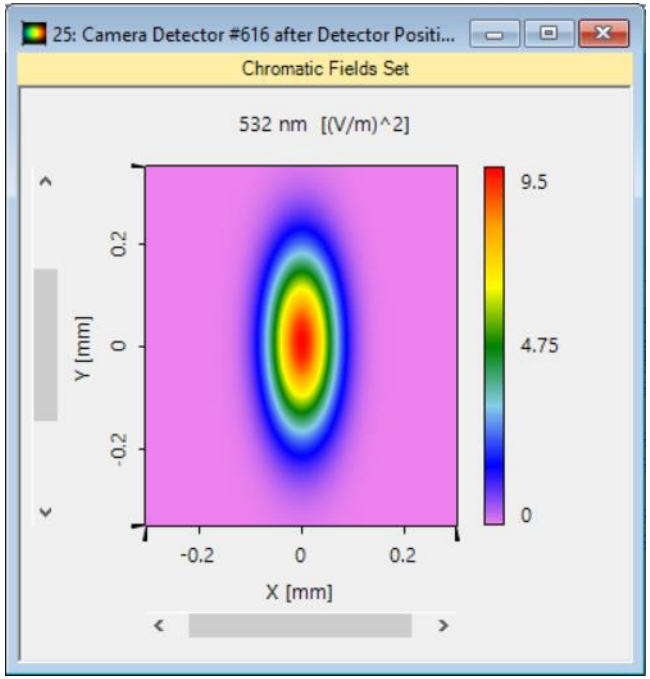
Physical-optics simulation of the complete system takes only 3 seconds.



Parameters	Values
focus spot diameter	68.7 µm × 68.9 µm

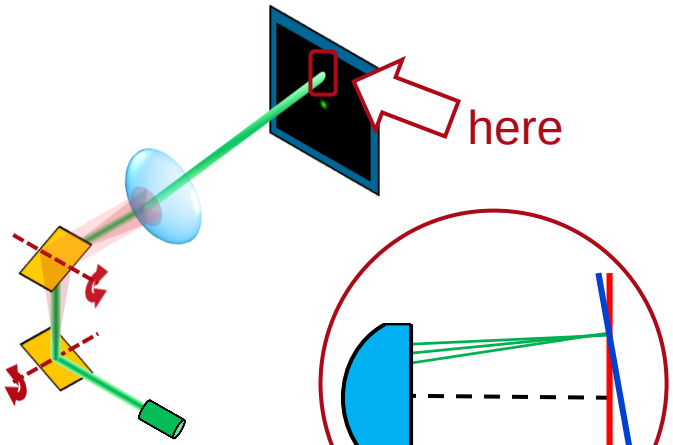
Results





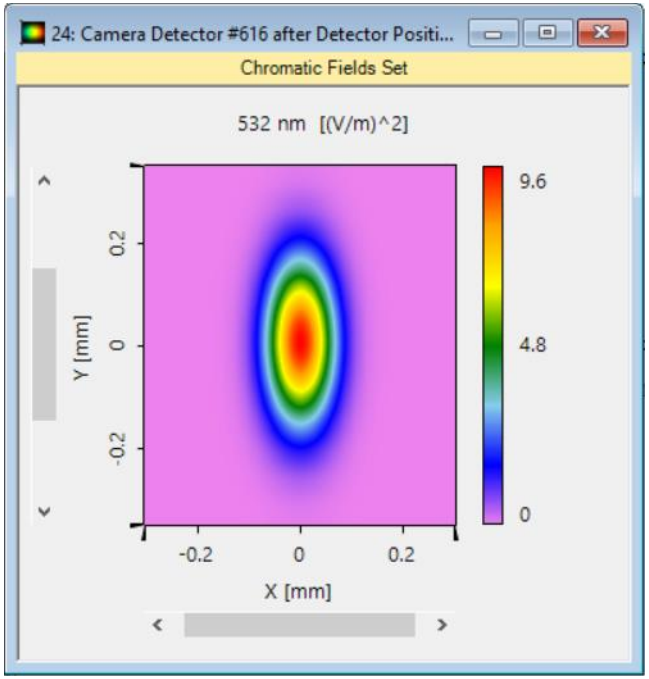
Parameters	Values
focus spot diameter	183.8 µm × 468.1 µm

Results



off-axis
theta = 25°

detector plane
tilted according
to beam direction



Parameters	Values
focus spot diameter	183.2 µm × 433.0 µm

Document Information

title	Performance Analysis of Laser Scanning System
version	1.0
VL version used for simulations	7.0.3.4
category	Application Use Case