

Optical Configuration of Sequentially Timed All-optical Mapping Photography with a Slicing Mirror

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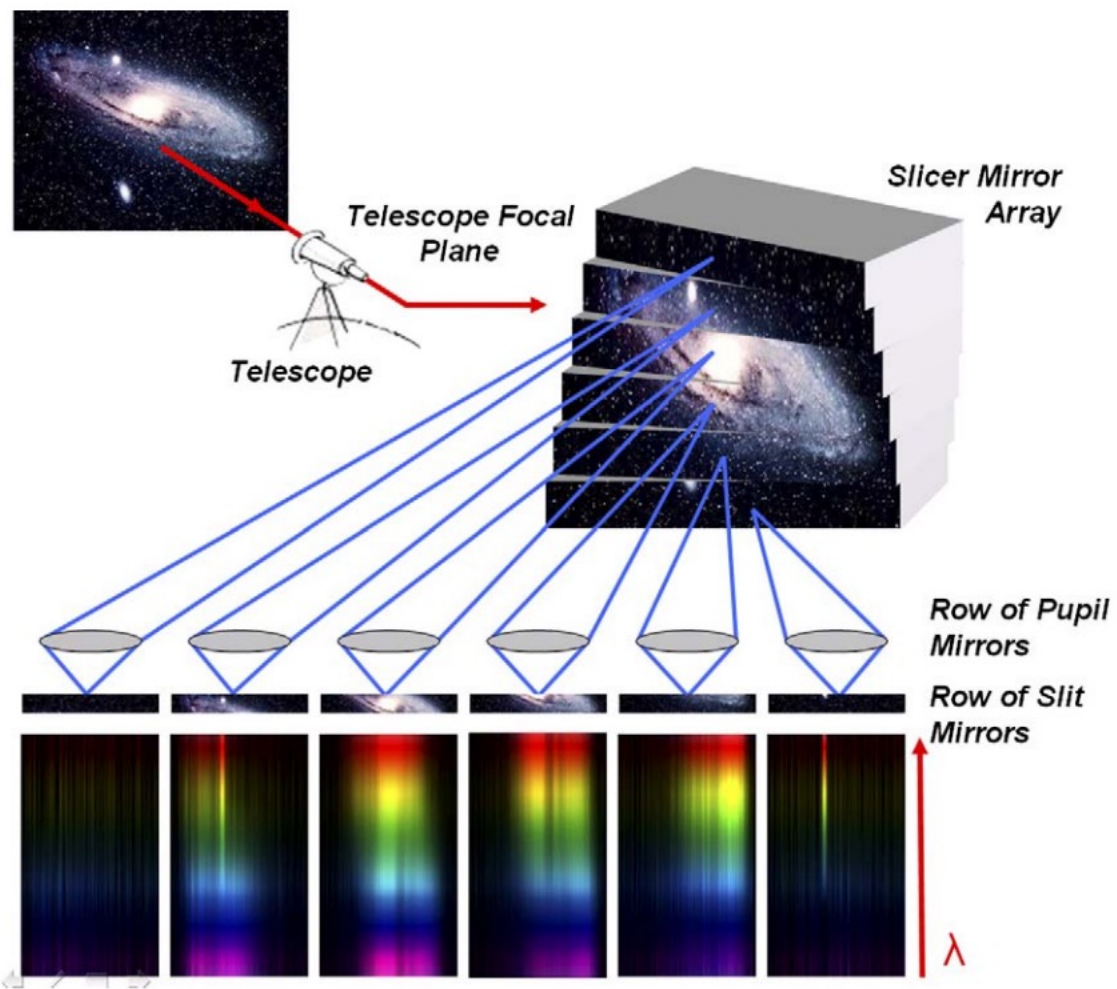
(3) RIKEN Center for Advanced Photonics, RIKEN

(4) School of Engineering, Tokyo Denki University

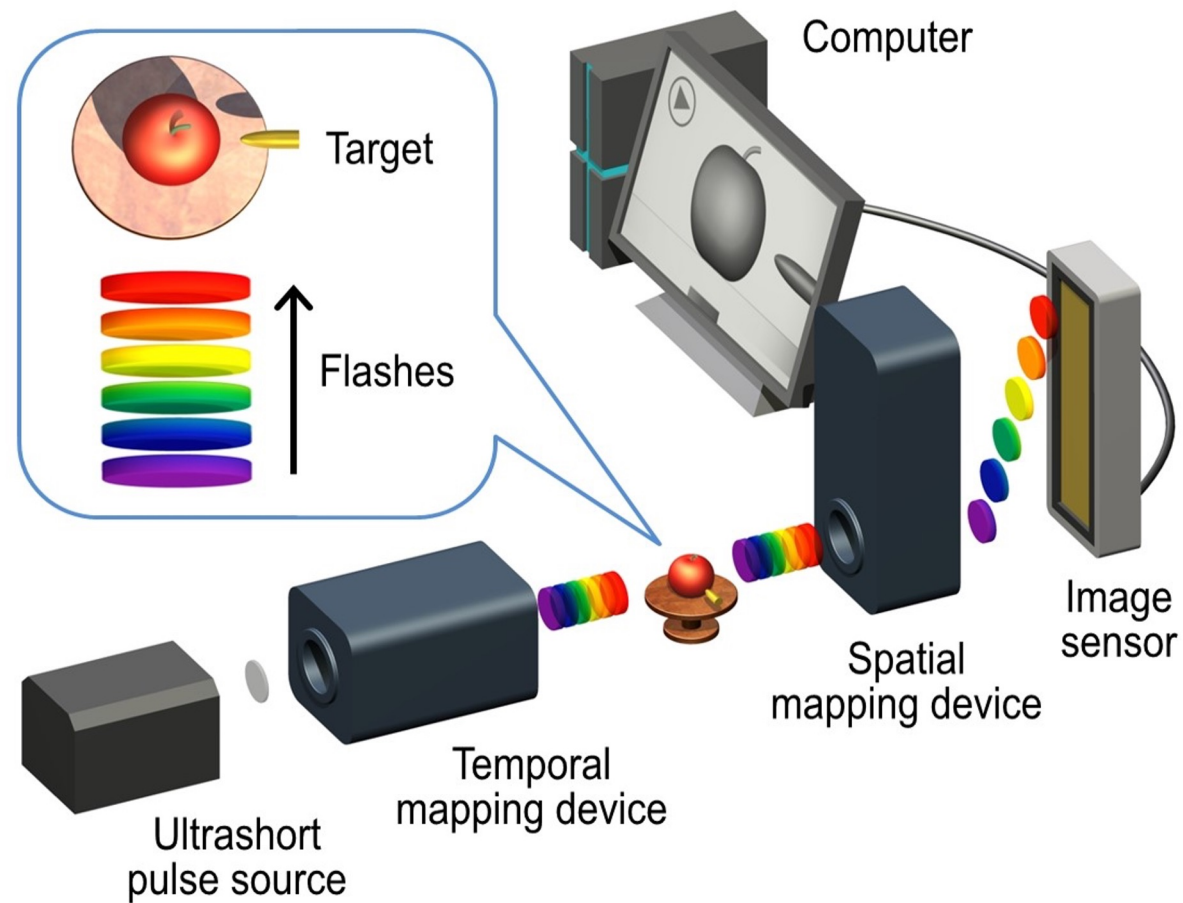
(5) Department of Astronomy, Graduate School of Science, The University of Tokyo

(6) Advanced Technology Center, National Astronomical Observatory of Japan

In astronomical observations



In biological studies



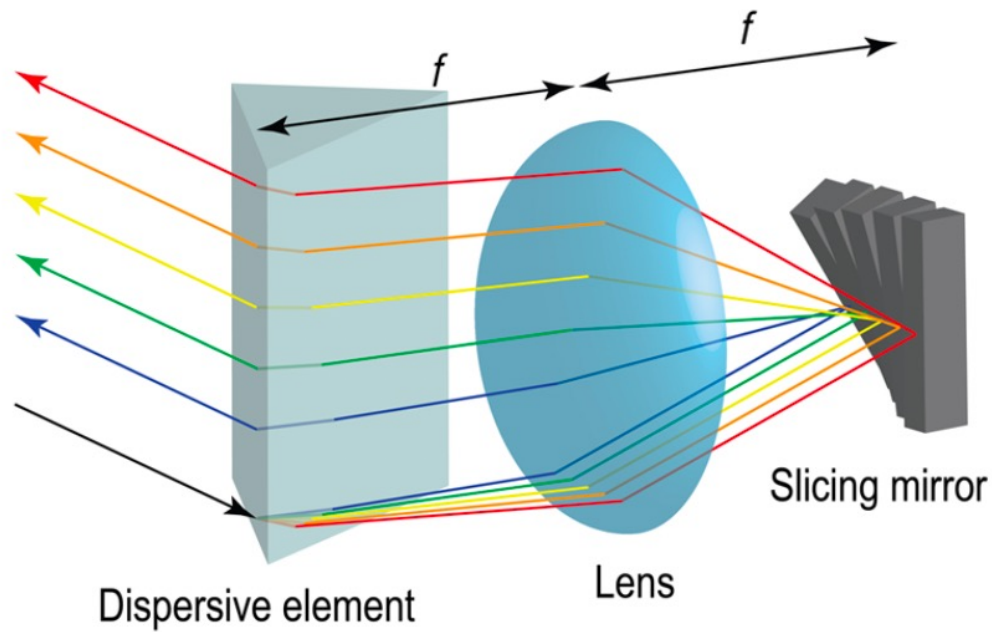
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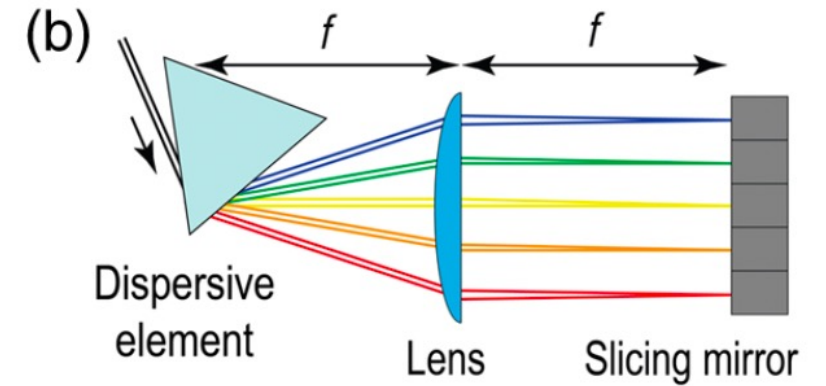
1. Spectral imaging with the slicing mirror based on a 4f optical system to perform STAMP imaging
2. The actual optical setting of spectral imaging in STAMP with the slicing mirror
3. The optical configuration combining STAMP and microscope is being constructed

Concept

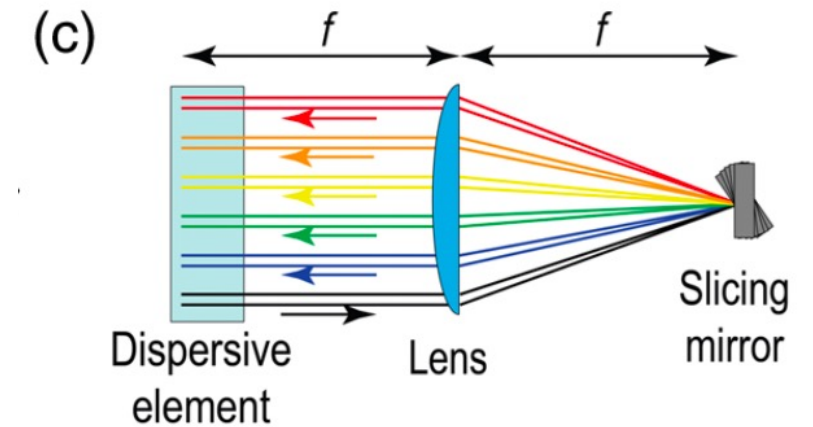
(a)



Top view

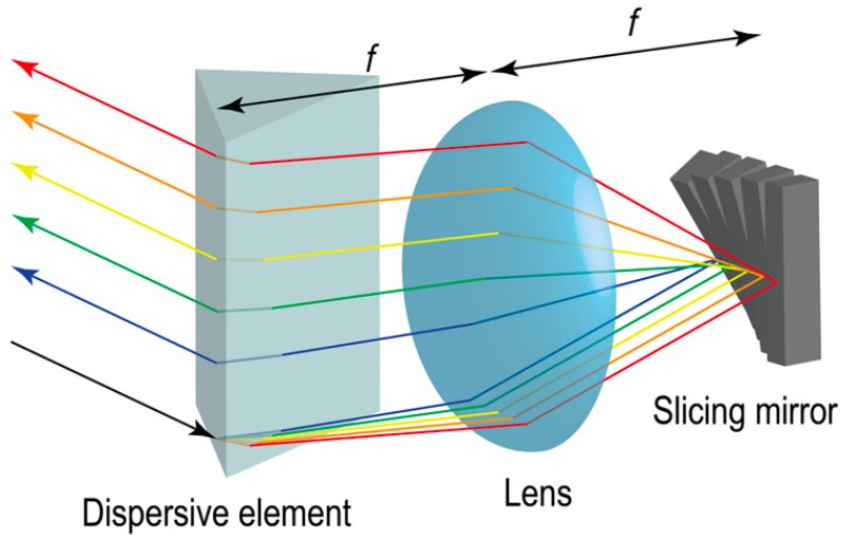


Side view

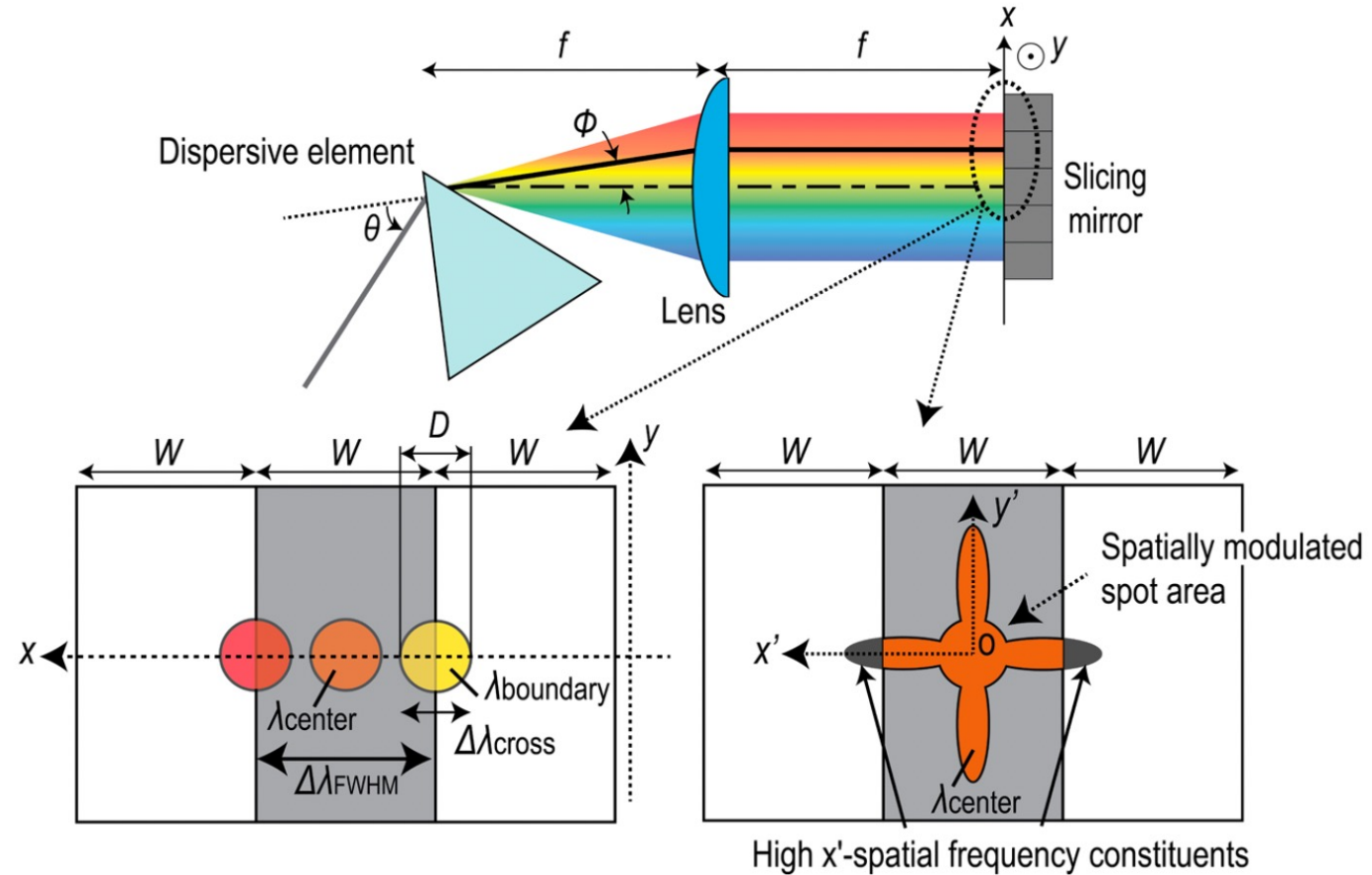


The slicing mirrors spatially separates overlapped images at the Fourier plane in the 4f system

Concept



Spectral Performance



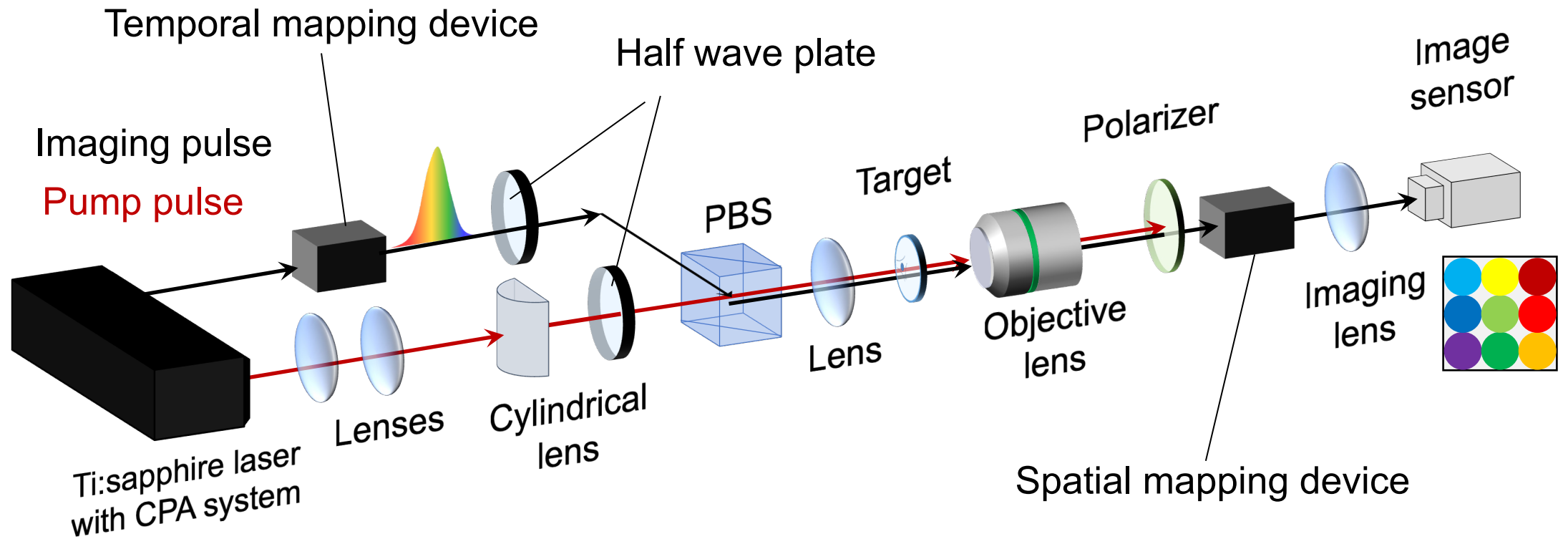
Small facets on the slicing mirror = more frames = worse spatial resolution

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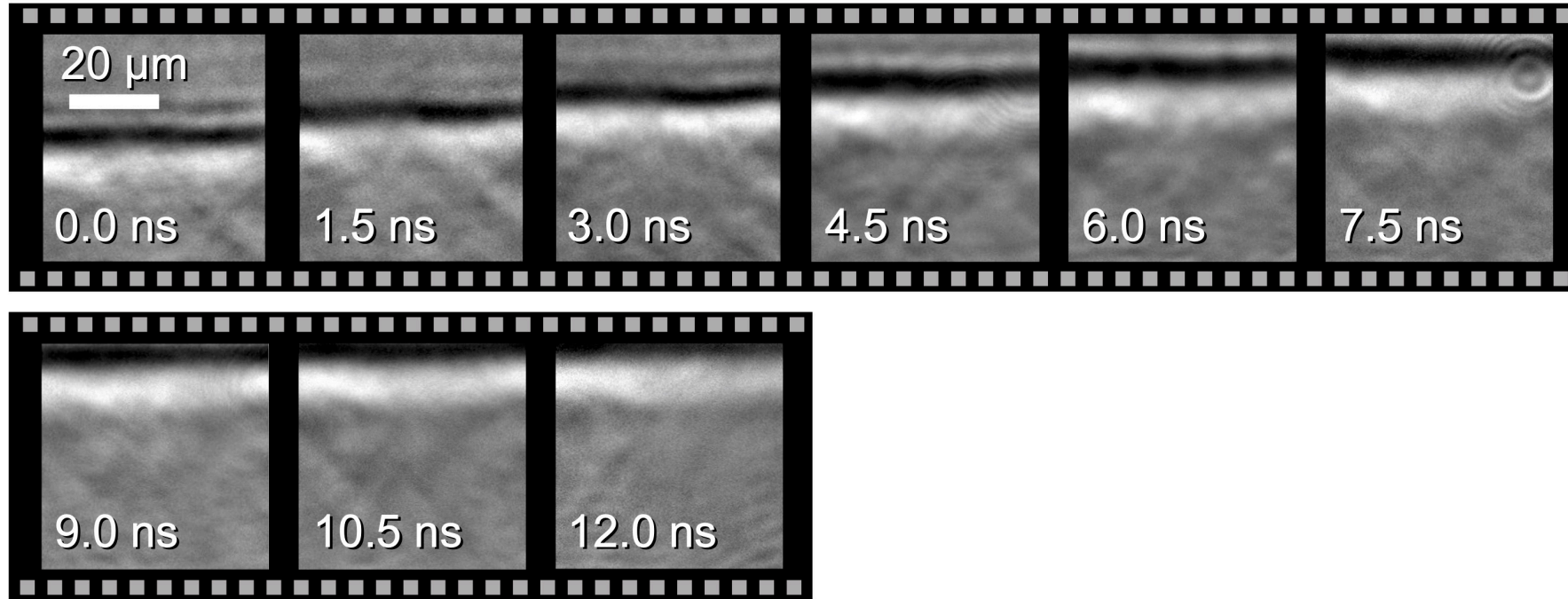
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The system for imaging dynamics of shock wave in water:

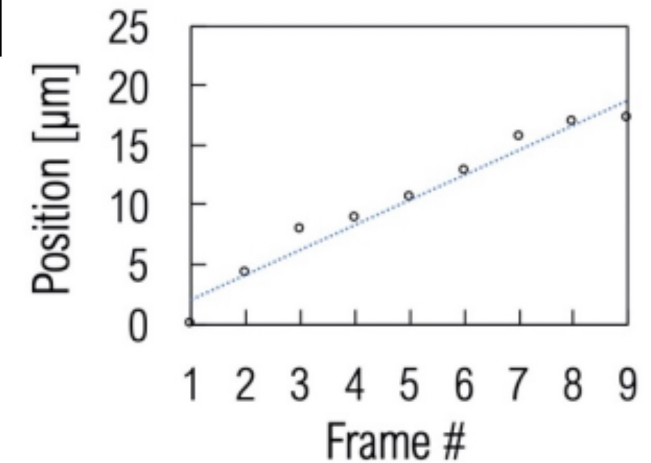


Frame interval: 1.5 ns
Exposure time: 24 ps
Number of frame: 9

Shock wave travelling upwards



Speed of the shock wave

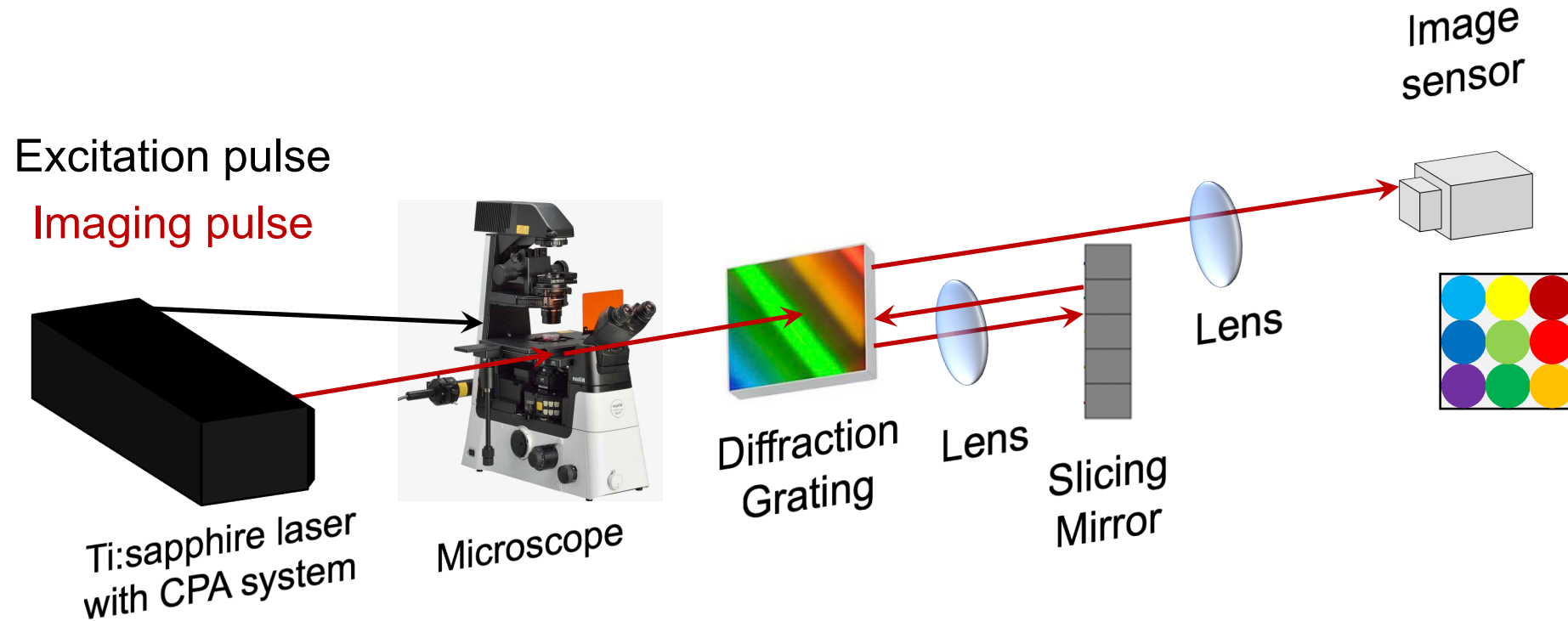


Successfully visualized the propagation of the shock wave, and measured the speed as 1.7 km/s

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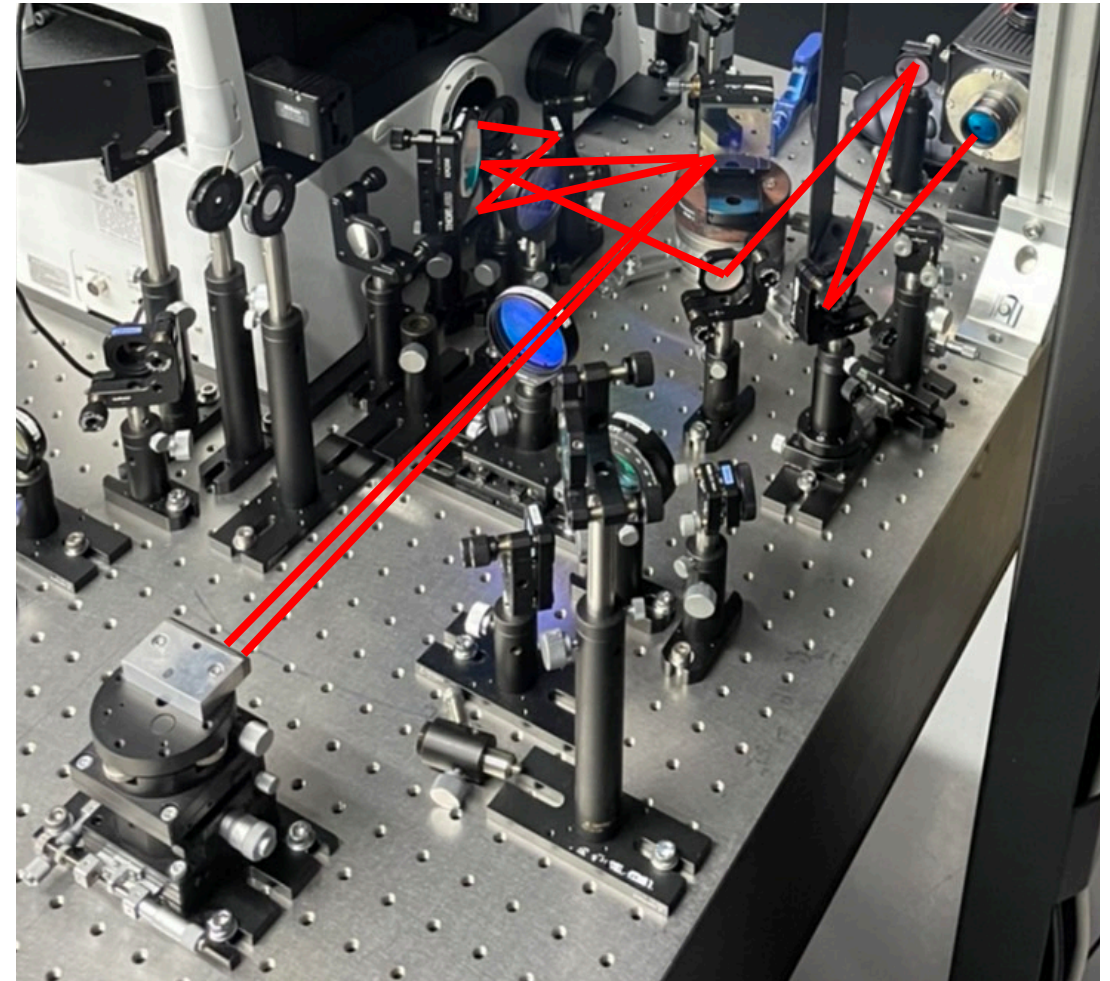
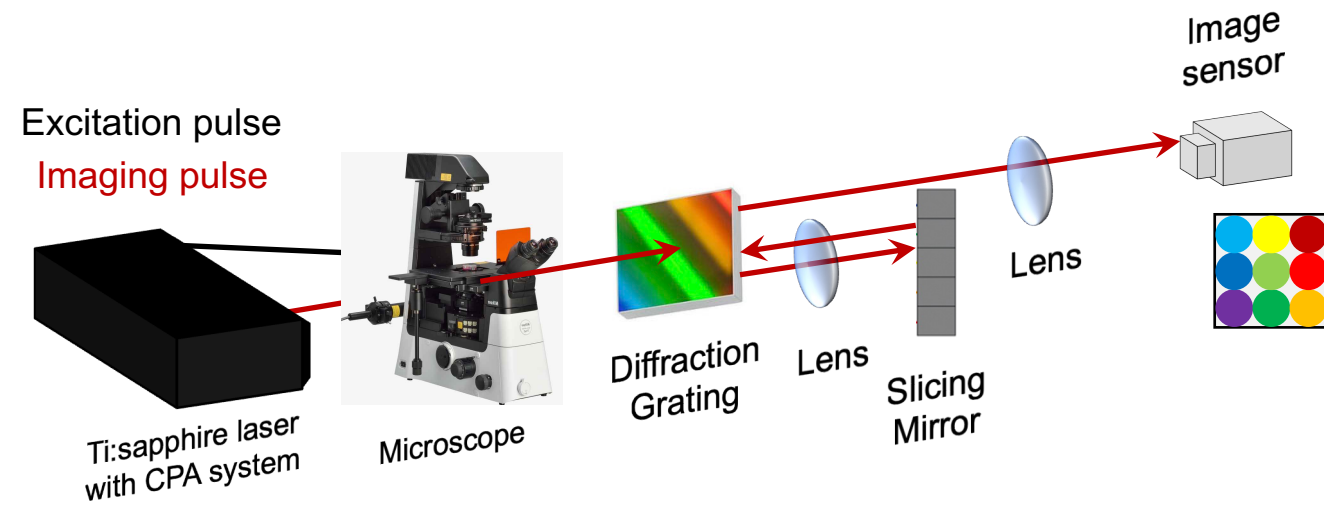
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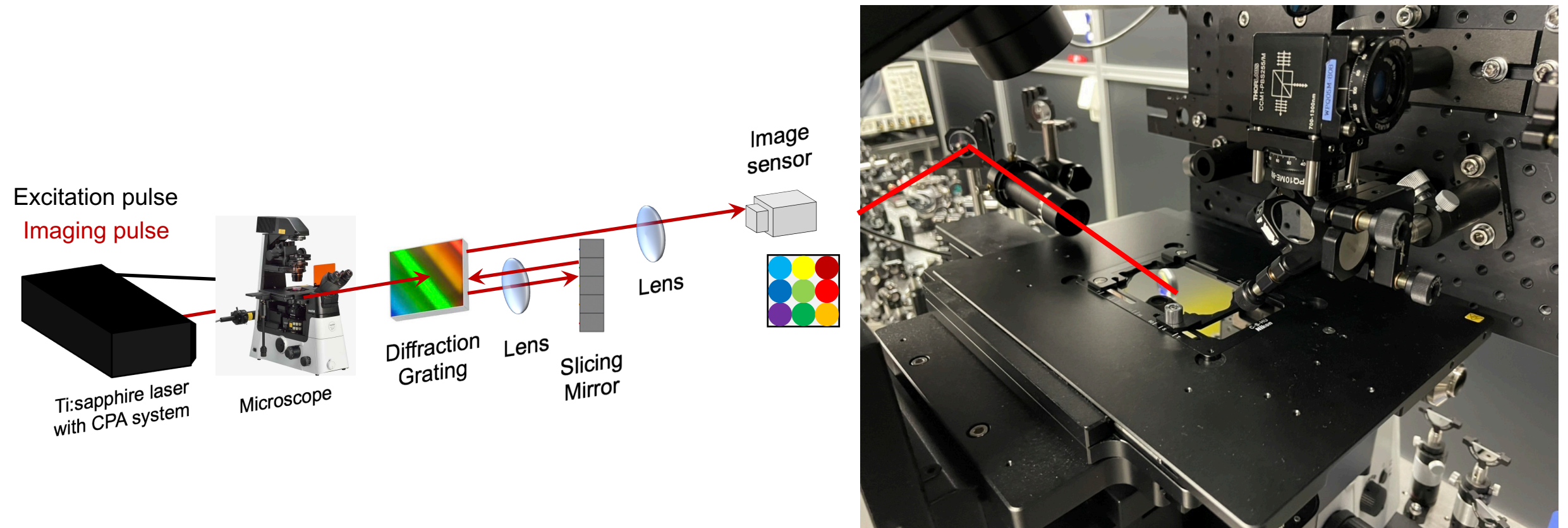


Excitation Pulse: 400 nm (femtoseconds)
Imaging Pulse: 800nm (picoseconds)
Number of frame: 9

Imaging pulse



Excitation pulse



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- **STAMP is a method that captures ultrafast phenomena with femtosecond and nanosecond timescale**
- **Spectral imaging with the slicing mirror based on a 4f optical system is constructed to perform STAMP imaging**
- **The width of the facets in slicing mirror contributes to the trade-off between the number of frames and spatial resolution**
- **The optical configuration combining STAMP and microscope is being constructed.**