



RAPID

European Laboratory for Non-linear Spectroscopy

 A **universal** solution for **real-time, image-based** autofocus in microscopy

TECHNOLOGY DESCRIPTION

We devised a new method for focus stabilization in optical microscopy. Standard methods rely either on contrast optimization (thus working offline) or on triangulation (requiring a reflective surface).

RAPID (Rapid Autofocus via Pupil-split Image phase Detection) extends to the entire field of view of the instrument the phase-detection principle, which is limited to selected points of interest in professional photography.

This method allows direct evaluation of the defocusing state of the system simply using the detected image. Therefore, RAPID is completely agnostic with respect to sample or microscope, and can be applied to all systems, in all settings.

RAPID overcomes limitations of current autofocus systems for microscopy

RAPID provides real-time operation without any reference reflection

A single solution can be used for all wide-field microscopes

AREAS

Automated microscopy | High-throughput microscopy | Autofocus systems | High-content screening



COMPETITIVE ADVANTAGES

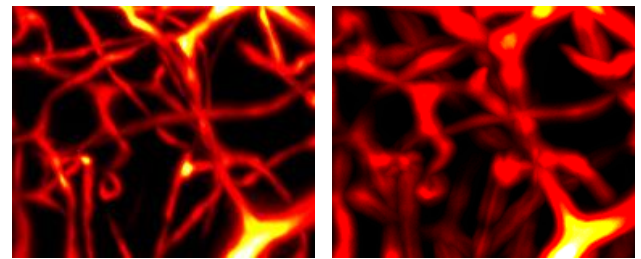
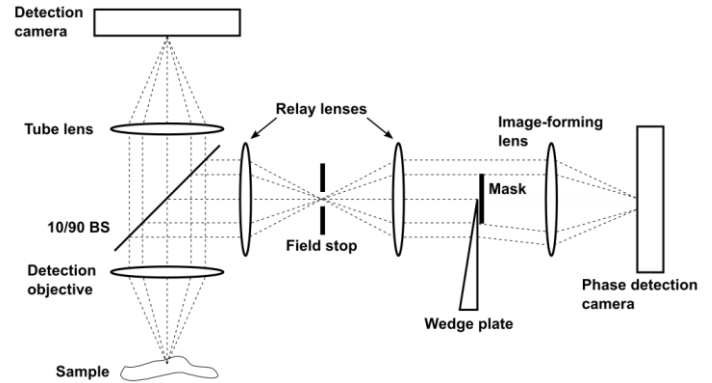
- Current methods either work **offline** by comparing images at different foci, or provide real-time stabilization of a **fiducial plane** that **might not coincide with the sample**. **RAPID** instead offers **real-time image-based autofocus**.
- A **versatile** solution applicable in every microscopy environment
- **No need** for reflective surface in the sample
- **Allowing 3D tracking** of fast-moving objects
- Can be **integrated in larger systems** from the beginning, or sold as an **add-on**

RAPID can be inserted in every optical microscope as an add-on, expanding the capabilities of existing apparatuses

APPLICATION & MARKET POTENTIAL

- RAPID can automate microscopy of complex samples
- RAPID is suitable for high-content screening, of fixed as well of living samples
- RAPID is applicable to any kind of wide-field microscopy: bright-field, dark-field, epifluorescence, light-sheet microscopy
- Worldwide optical microscopy market in 2018 is about 2 billions \$ [marketsandmarkets.com]

RAPID optical scheme



RAPID

No autofocus

TECHNOLOGY READINESS LEVEL



REFERENCES

- <https://www.biorxiv.org/content/10.1101/170555v1>
- Collaboration with University of Florence and National Research Council for technology R&D
- Patent pending. PCT application PCT/EP2017/084057
- Working prototype present at LENS
- Technology licensed by L4T (www.l4t.it)

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