# LUMINOSA

## A Significant Advancement for Bioimaging Core Facilities – Insights from Professor Marco Fritzsche at the University of Oxford

During a scientific workshop held on October 17th, 2024, at the University of Oxford, we had the opportunity to discuss the use of Luminosa, a confocal fluorescence microscope optimized for Fluorescence Lifetime Imaging (FLIM), with Professor Marco Fritzsche, the Scientific Director of the Oxford-ZEISS Centre of Excellence (Oxford-ZEISS CoE).

Prof. Marco Fritzsche, Scientific Director
Oxford-ZEISS Centre of Excellence

**Professor Fritzsche's Research and Role in Microscopy Facilities**

Professor Fritzsche leads the Biophysical Immunology Lab (BPI), a multidisciplinary research group at the Rosalind Franklin Institute and the Kennedy Institute at the University of Oxford. His work centers on investigating how mechanical forces orchestrate immune responses, leveraging custom-designed microscopy systems and quantitative experimental techniques to drive forward the field of mechanobiology.

"At the Oxford-ZEISS CoE, we focus on developing advanced microscopy technologies to support cutting-edge research in biophysics and immunology," Professor Fritzsche explains. "Our aim is to ensure that these sophisticated technologies are made accessible to researchers, particularly those with limited prior experience in microscopy."

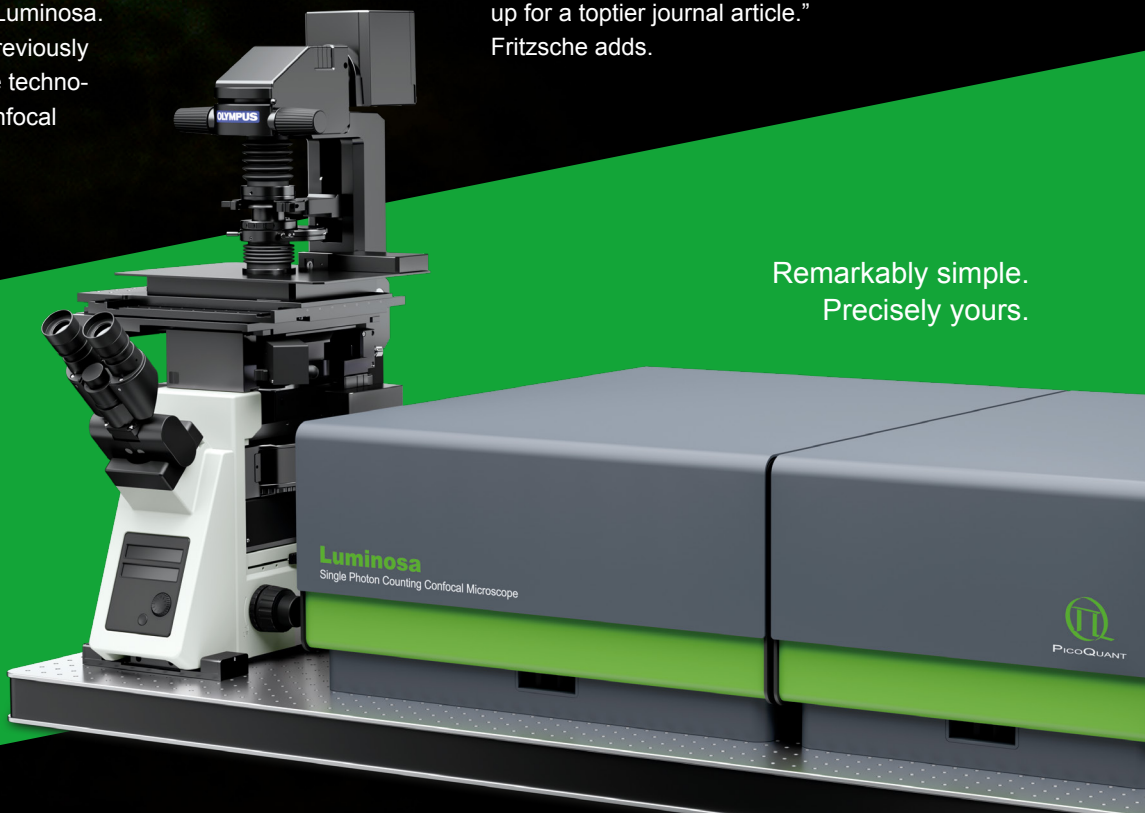
**Motivation for Testing Luminosa**

The BPI lab has a strong focus on fluorescence imaging and photon-counting methodologies, which naturally aligns with the introduction of Luminosa. The Oxford-ZEISS CoE had previously integrated PicoQuant's lifetime technologies into their ZEISS 980 confocal systems.

"Upon learning about Luminosa, we were intrigued by its capabilities," Professor Fritzsche notes. "Luminosa's single-photon counting technology, designed for routine operation, complemented our objectives to provide cutting-edge instrumentation to researchers who may not have a background in optical engineering."

*"A summer student who had little prior experience with fluorescence microscopy, was able to generate independent data within just 1-2 days of training."*

The decision to test Luminosa came after Uwe Ortmann, Head of Sales in PicoQuant suggested an extended demonstration. "We seized the opportunity to evaluate Luminosa, and during this trial period and at the outset, the results of the extended demo speak for itself. We could not only contribute to make the software interface a little better, but, we actually discovered new biology, which we are aiming to write up for a toptier journal article." Fritzsche adds.

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**Luminosa in Oxford**

Over a three-month evaluation period, the BPI team collaborated closely with PicoQuant's engineers and application specialists. The testing was incorporated into two research projects:

1. Detection of Colorectal Cancer, in collaboration with surgeon Professor Simon Buczacki.

2. Investigation of Mechanics in Murine Embryo Development, led by Professor Shankar Srinivas, a prominent figure in developmental biology.

These projects provided ample data to assess the utility of Luminosa in answering key biological questions, with promising results for both cancer detection and developmental biology applications.

**Learning Curve for New Users**

One of Luminosa's key advantages is its user-friendly interface, which facilitates rapid adoption by new users. Professor Fritzsche highlights the ease with which researchers can become proficient in using the system: "We were pleased to find that the learning curve for Luminosa was significantly shorter than anticipated. A summer student, Yuexuan Zhang from the University of Cambridge, who had little prior experience with fluorescence microscopy, was able to generate independent data within just 1-2 days of training."
The instrument's intuitive interface does not compromise on performance, as it also meets the needs of experienced users. "Even my postdoctoral researchers, who are well-versed in advanced microscopy techniques, were impressed by Luminosa's capabilities,"
he comments.

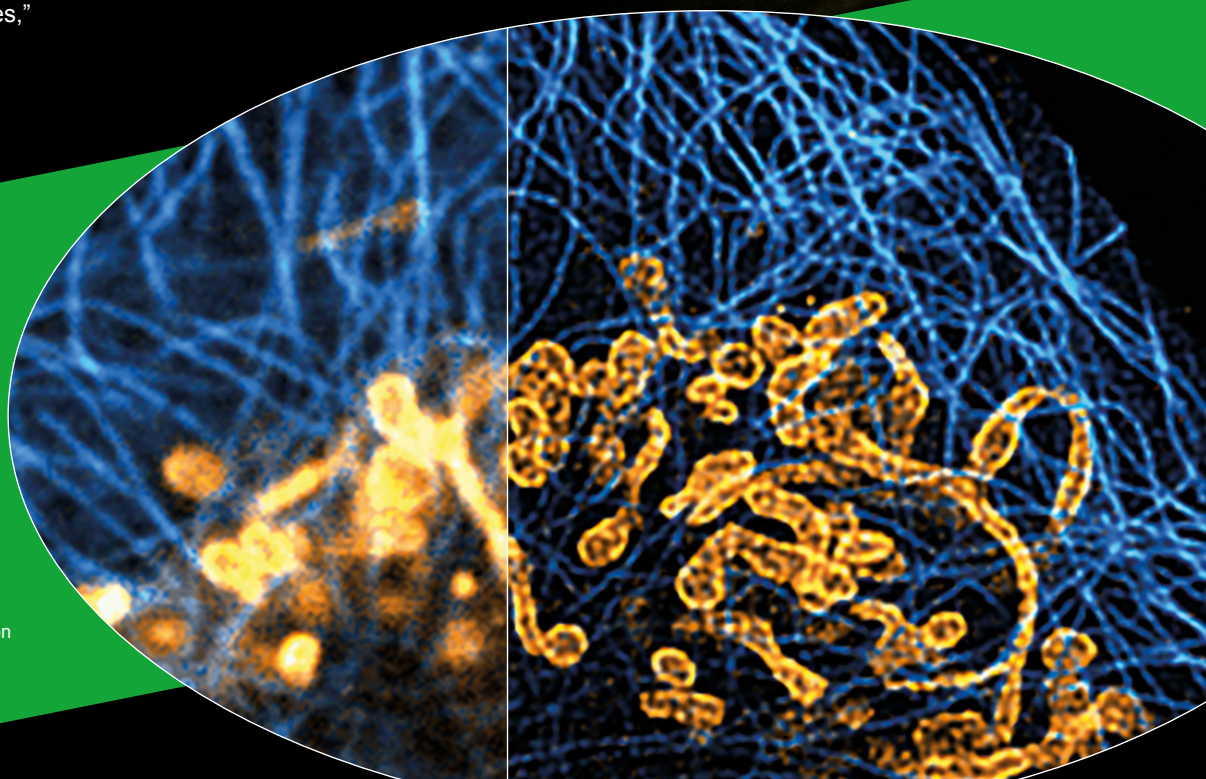
**Luminosa's Role in Bioimaging Core Facilities**

When asked about the potential of Luminosa in bioimaging core facilities, Professor Fritzsche offered a strong endorsement:
"I believe Luminosa is well-positioned to become a widely adopted FLIM and single molecule fluorescence platform in the biomedical sciences," he asserts. "Its robust design, ease of use for less-experienced users, and advanced features for experts make it a highly versatile system. It is competitive with technologies available from the big microscopy manufacturers and it definitely can enrich the capabilities of any bioimaging core facility. "

**Conclusion: Luminosa's Impact on Core Facility Imaging**

The evaluation of Luminosa at the Oxford-ZEISS Centre of Excellence demonstrated its technical performance and accessibility, confirming its utility in both high-level research and routine imaging applications. With its combination of user-friendly operation and sophisticated features, Luminosa represents an important development in FLIM technology for core facilities seeking to enhance their imaging capabilities and offer their user best-in-class performance. As the needs for lifetime imaging are increasing and FLIM finds more application areas and attracts the interest of more users, Luminosa is the ideal choice for core facilities aiming to integrate a best-in-class advanced dedicated system in their portfolio of microscopes.

Discover the full story behind Luminosa. Visit our website for more insights and details!



Lifetime-based marker separation in confocal (left) and ISM-FLIM image (right).