

# *Optimizing Multi-photon Fluorescence Microscopy Light Collection by Total Emission Detection (TED)*

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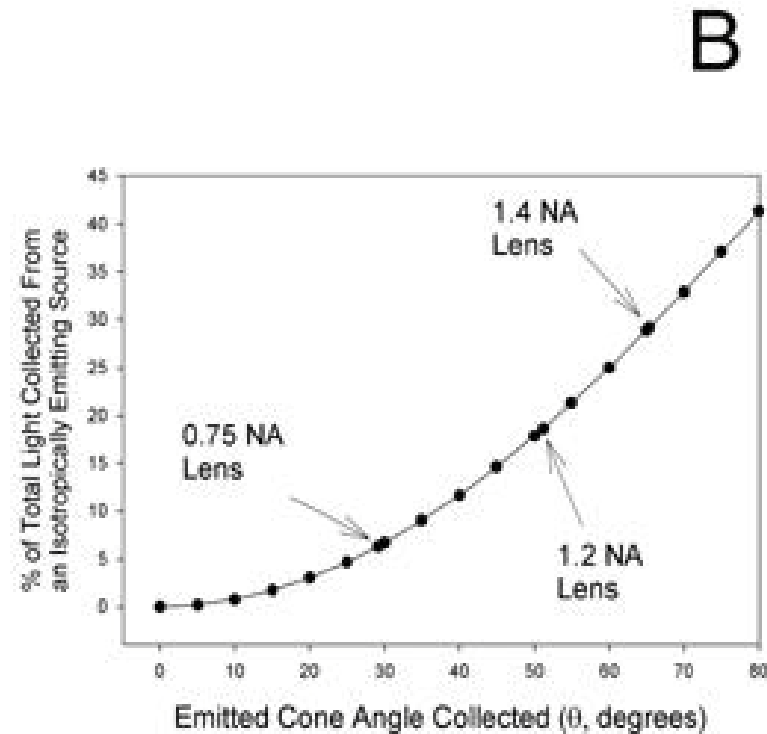
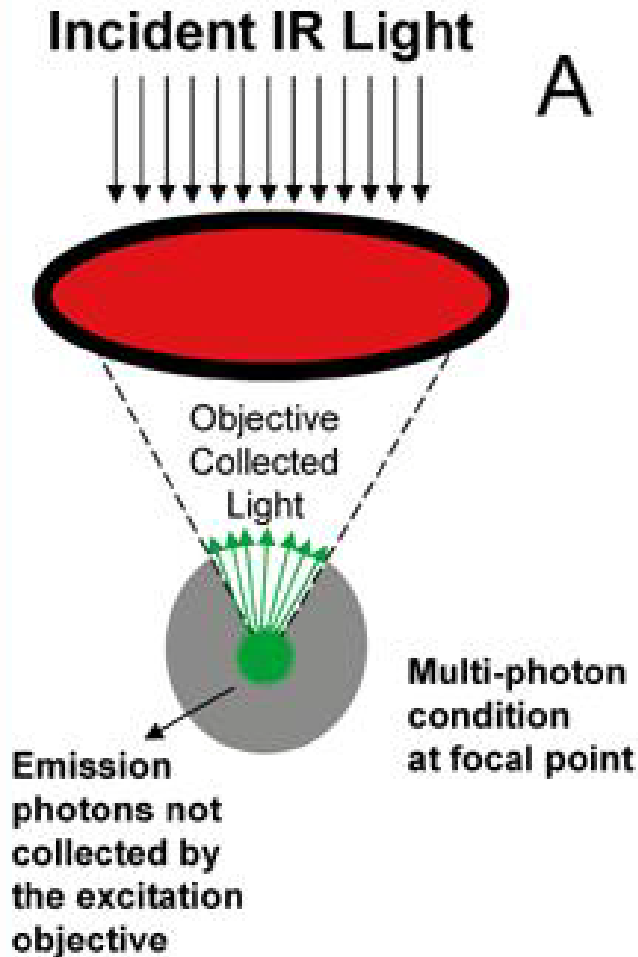
# Technology

- Multi-photon fluorescence microscopy (MPFM) is an imaging technique that can investigate biological processes to sub-cellular resolution at depths of hundreds of microns below the surface of biological tissues.
- MPFM is currently limited by the use of inefficient light collection systems—detects a fraction of the light emitted from sample

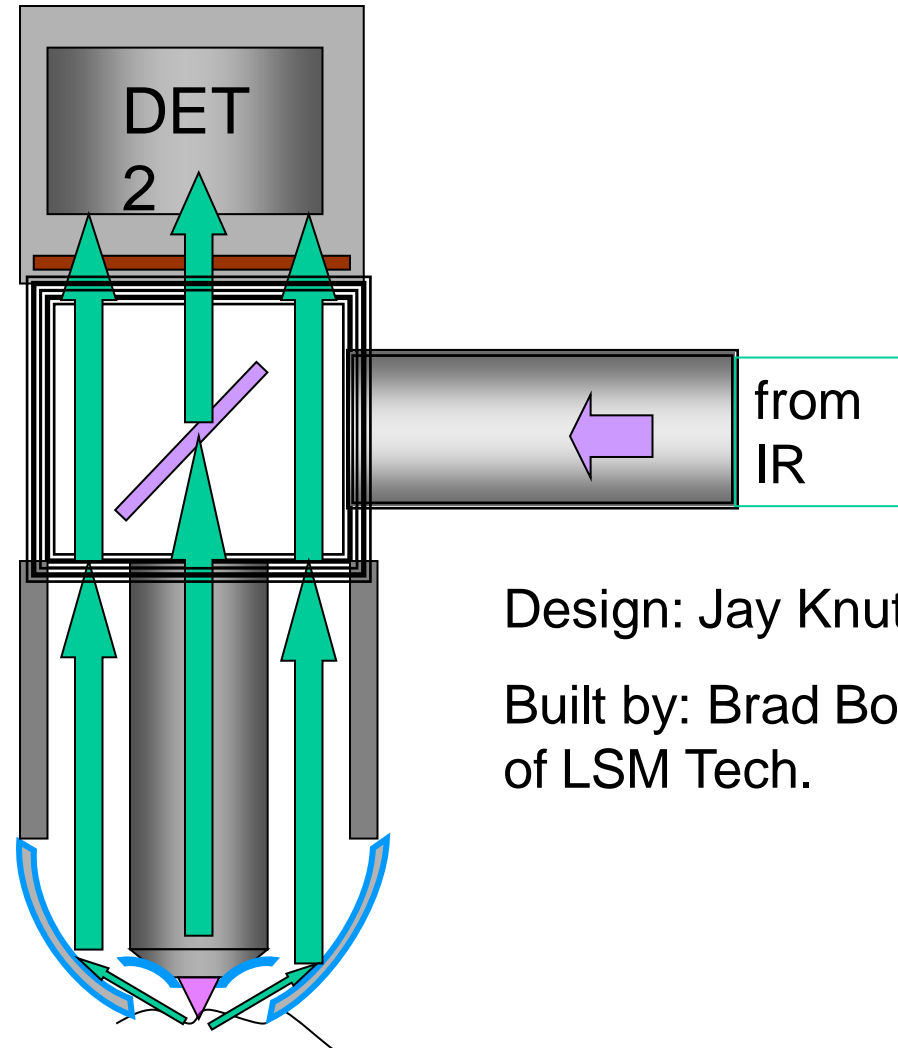
# *Total Emission Detection (TED)*

- **New system maximizes probability of collecting all emitted fluorescent light to a detector**
  - Enhanced brightness of light from the sample
  - Increase signal-to-noise ratio (SNR).
    - Improved time resolution
    - Reduced laser power requirements
    - Reduced photodynamic damage
- Stage of research: Prototype
- PCT Application #PCT/US2007/17478 filed 08/06/2007  
US Application #11/979,600 filed 11/06/2007

# Total Emission Detection: Concept



# *TED II for in vivo Studies*



Design: Jay Knutson

Built by: Brad Bobbitt  
of LSM Tech.

# *DS-red tagged actin in blood vessel of intact mouse brain*

Parabola Collected Light

Objective Collected Light

**TED II collects 2.5x more light than objective alone**

# *Commercial Applications*

Optimized MPFM emission detection of deep fluorescence imaging of biological tissues and cells

# *Collaboration Opportunities*

**Licensing Status:** Available for licensing

**Collaborative Research Opportunity:**

Further develop, evaluate, or commercialize a total emission detection system for multi-photon imaging.

## *Collaborators and Contributors to This Work*

- Dr. Robert Balaban and Dr. Merav Lugar-Hammer  
(NHLBI Lab of Cardiac Energetics)
- Drs. Jay Knutson and Aleksander Smirnov  
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- Drs. Amir Gandjbakhche and Jason Riley  
(NICHD Section on Biomedical Stochastic Physics)
- Dr. Christian A. Combs  
(NHLBI Light Microscopy Core Facility)
- Brad Bobbitt  
(LSM Technologies, Stewartstown, PA)



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