PALEOCCENE collaboration

Krystal Alfonso, Gabriela R. Araujo, Laura Baudis, Nathaniel Bowden, Bernadette K. Cogswell, Anna Erickson, Michelle Galloway, Adam A. Hecht, Rathsara R. H. Herath Mudiyanselage, Patrick Huber, Igor Jovanovic, Giti A. Khodaparast, Brenden A. Magill, José Maria Mateos Melero,Thomas O'Donnell, Nicholas W. G. Smith, Felicia Sutanto, Nikita Vladimirov, Keegan Walkup, Xianyi Zhang

Georgia Tech

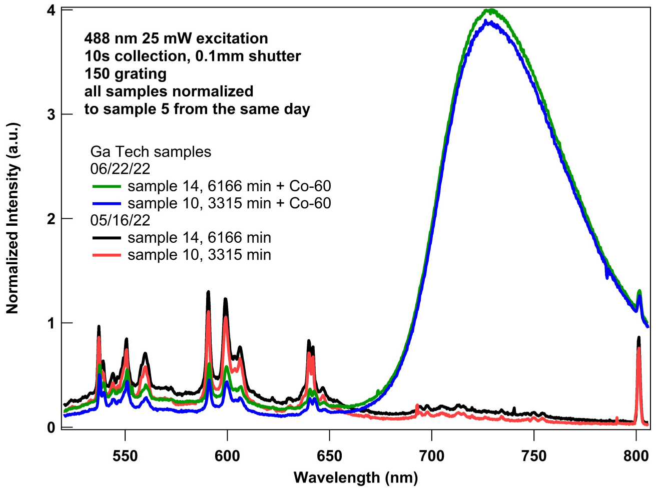
Lawrence Livermore National Laboratory

Universität Zürich UZH

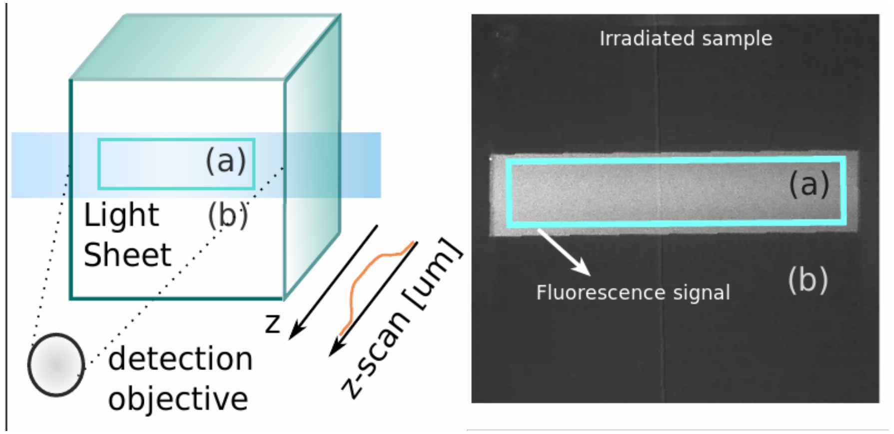
THE UNIVERSITY OF NEW MEXICO

UNIVERSITY OF MICHIGAN

VIRGINIA TECH



Precision spectroscopy plays a key role in understanding the microphysics of color center formation



Light-sheet microscopy shows fluorescence induced by irradiation in the bulk of crystals: Signal from non-irradiated samples is comparable to non-illuminated region while intense fluorescence is observed from the illuminated region within an irradiated sample fluorescence.

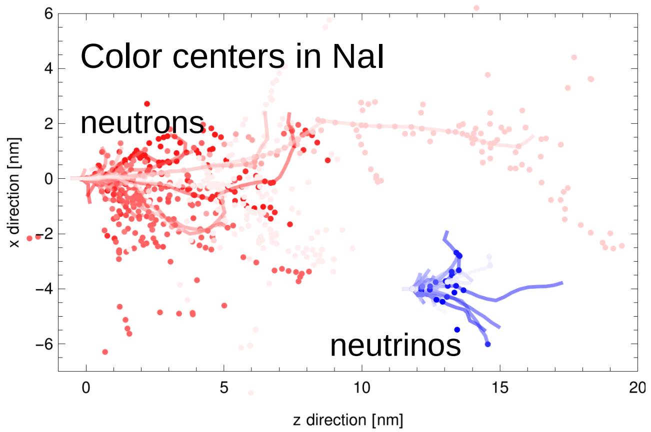
Passive neutrino detection for reactor monitoring

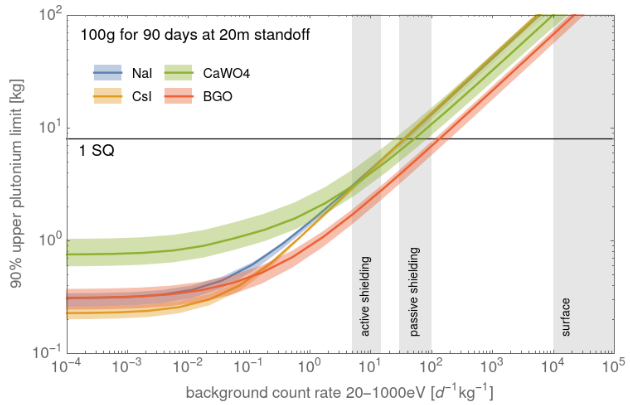
B.K. Cogswell, A. Goel, P. Huber arXiv:2104.13926

Nuclear reactors make lots of neutrinos, which can not be shielded. Good for reactor monitoring.

BUT

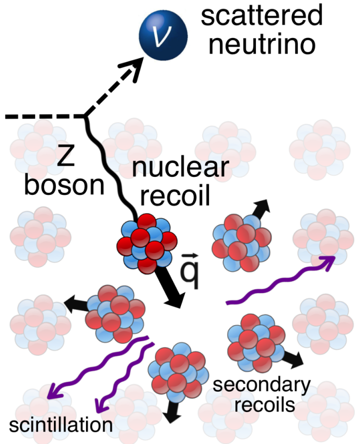
Current neutrino detectors require large and actively instrumented volumes.





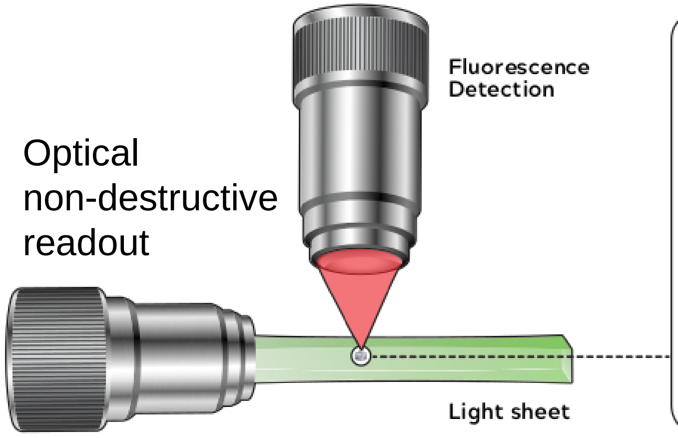
- Nuclear recoils damage crystal lattice permanently, either by forming tracks or vacancies
- This allows off-site readout, hence detector is **passive**
- **Intrinsic rejection** of ionizing backgrounds

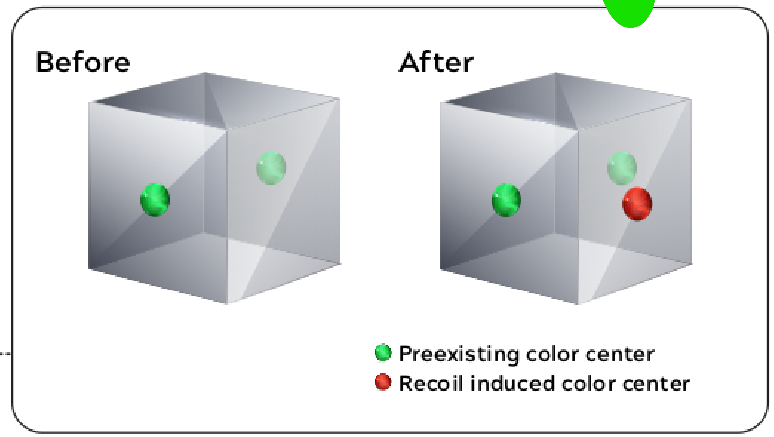
- **Verification of reactor shutdown at 20m standoff**
- **90 day, 1SQ criterion**
- **100g (!) passive detector**
- **Few hours scan time**



Instead use coherent elastic neutrino nucleus scattering (CEvNS) allowing for passive small detectors exploiting color center defects in crystals.

Optical non-destructive readout





pahuber@vt.edu