Daniel Vander-Hyde

Experimental Physicist / Engineer

daniel.vanderhyde722@gmail.com

github.com/dancvan
linkedin.com/in/daniel-c-vanderhyde

EXPERIENCE

Graduate Student Researcher
LIGO / Syracuse University Center of Coatings Research

MAY 2019 — JUN 2024
Syracuse, NY

- Designed an innovative electro-optical study for highly reflective (HR) crystalline coatings, implementing Pound-Drever-Hall feedback.
- Sucessfully locked a fundamental laser mode from a Mephisto 2000 (1064 nanometer wavelength) laser to a high finesse, short length optical cavity (0.105 [meter]).
- Simulated and prototyped feedback and sensing electronics in LTspice to be built and installed in closed-loop feedback control.
- Constructed numerical simulations and computations to inform experiment design and calibration.
- Rapidly prototyped and developed custom non-conductive tabletop optical suspensions using CAD tools and 3D printing.
- Measured and published a calibrated electro-optic response from a novel HR Gallium Arsenide / Aluminum alloyed Gallium Arsenide coating, influencing the future of mirror coating investigations.

LIGO Research Fellow
LIGO Hanford Observatory (LHO)

JUN 2018 — MAY 2019
Hanford, WA

- Worked with state of the art optical components at a large scale Laser Interferometric Gravitational wave Observatory to help achieve collaboration goals during Observing Run 3 (O3).
- Led alignment / imaging and maintenance of CO_2 lasers and optical sensors (Hartmann wavefront sensors) at the LHO as part of the adaptive optics comissioning.
- Demonstrated analytical skills designing digital (zero-pole-gain) filters for control loops.
- Developed and implemented a digital filter to existing thermal adaptive optics actuators for improved thermal compensation (85% faster), positively impacting productivity.
- Used optical spectrum analyzers to quantify diverse transverse optical mode content from the carrier beam at the detector output.
- Collaborated with a large team of senior engineers and physicists on a daily basis, coordinating work over weekly meetings, electronic log entries, and submitted job requests.

Undergraduate Research Assistant
LIGO, Fulleron Scatterometer

MAY 2012 — MAY 2015
Fullerton, CA

- Recorded images of scattered light from optical samples illuminated by 1064 nanometer wavelength laser light over a wide range of angles.
- Conducted experiment calibration and analysis to compute the bi-directional reflectance distribution function (BRDF) and total integrated scatter (TIS) with recorded data.
- Improved measurement and analysis techniques with upgrades to LabVIEW and Matlab code to improve measurement taking efficiency and accuracy.
- Collaborated in a small team enviornment (3-4 other members) with constant communication and coordination over weekly meetings and electronic logs to achieve research objectives.
- Measured and published an optical loss measurement from a novel coating solution for next-generation, quantum noise reducing, gravitational wave detector technology.

EDUCATION

PhD in Physics, *Syracuse University*	JUN 2024
MS in Physics, *Syracuse University*	MAY 2017
BS in Physics, *Californa State University, Fullerton*	MAY 2015
LIGO Hanford Fellowship	2018 — 2019
STEM Fellowship	2015 — 2018

PATENTS AND PUBLICATIONS

1. Fabian Magaña Sandoval, Stefan Ballmer, Thomas Vo, Daniel Vander-Hyde, and Jax Sanders. Mode converter and quadrant photodiode for sensing optical cavity mode mismatch. U.S. Patent 10453971, Oct 2019

2. Satoshi Tanioka, Daniel Vander-Hyde, Garrett D. Cole, Steven D. Penn, and Stefan W. Ballmer. Study on electro-optic noise in crystalline coatings toward future gravitational wave detectors. *Phys. Rev. D*, 107:022003, Jan 2023

3. T Hardwick, V J Hamedan, C Blair, A C Green, and D Vander-Hyde. Demonstration of dynamic thermal compensation for parametric instability suppression in advanced ligo. *Classical and Quantum Gravity*, 37(20):205021, sep 2020

4. Fabian Magaña Sandoval, Thomas Vo, Daniel Vander-Hyde, J. R. Sanders, and Stefan W. Ballmer. Sensing optical cavity mismatch with a mode-converter and quadrant photodiode. *Phys. Rev. D*, 100:102001, Nov 2019

5. Daniel Vander-Hyde, Claude Amra, Michel Lequime, Fabian Magaña-Sandoval, Joshua R Smith, and Myriam Zerrad. Optical scatter of quantum noise filter cavity optics. *Classical and Quantum Gravity*, 32(13):135019, Jun 2015