

Sudarshan Karki

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OVERVIEW

- Extensive research experience with complex, high-precision experiments, including design, fabrication, characterization and commissioning.
- Processing, visualization, and statistical analysis of large data sets.
- Problem solving both independently and collaboratively in dynamic, time-critical environments.

EDUCATION

Doctor of Philosophy, Physics, LIGO Project University of Oregon, Eugene, OR, 97403 Dissertation : Accurate and Precise Calibration of Advanced LIGO Detectors in the Era of Gravitational wave Astronomy	Mar 2019
Master of Science, Physics University of Oregon, Eugene, OR, 97403	Dec 2015
Bachelor of Science, Summa Cum Laude, Physics University of Missouri Kansas City (UMKC), Kansas City, MO	Dec 2010

SKILLS

Programming	Mathematica, Latex, MATLAB, Python–pandas, numpy, scipy
Software & Tools	COMSOL, LabVIEW, MATLAB Simulink

AWARDS AND SCHOLARSHIPS

Special Breakthrough Prize-Fundamental Physics	Milner Foundation	2016
Guber Cosmology Prize	Guber Foundation	2016
LIGO Fellowship	LIGO-Caltech	2014
K. F. Cheng Physics Scholarship	UMKC	2010
K. L. Cheng Physics Scholarship	UMKC	2009

PROFESSIONAL EXPERIENCE

LIGO Fellow/ Graduate Research Assistant Laser Interferometer Gravitational-wave Observatory (LIGO)	Aug 2014- March 2019 Richland, WA
<ul style="list-style-type: none">• Development, installation, commissioning and characterization of a novel laser-based calibration tool called the “Photon calibrator”.• Sub-percent absolute length calibration (at the 10^{-19} m level) of the LIGO detectors for the first direct observation of gravitational waves.• Modeled deformation of the LIGO test masses (40 kg fused silica optics) due to calibration forces, using finite element analysis, and demonstrated the effect using the interferometer.• Developed MATLAB and Python-based software to analyze large amount of data using LIGO’s computer cluster to study long term stability of the calibration.	
Graduate Teaching Assistant University of Oregon	Sep 2012 -March 2019 Eugene, OR

- Assisted professors with lower-division and upper-division undergraduate physics courses.
- Designed and administered experiments for undergraduate physics laboratory courses.

Research Associate

Jan 2011 – Aug 2012

University of Missouri-Kansas City

Kansas City, MO

- Development of plasma-enhanced chemical vapor deposition system for thin film fabrication with in-situ metal contacts application.
- Deposition of hydrogenated boron carbide thin films for low-k materials and neutron detection devices.
- Characterization of thin film devices using ellipsometry, I-V, C-V measurements.
- Study of neutron detection device efficiency using the research reactor at University of Missouri Columbia.

Student Research Assistant

May 2008 – Dec 2010

University of Missouri-Kansas City

Kansas City, MO

- Deposition of B_4C thin films using highly enriched ^{10}B targets for neutron detection devices.
- Development of high-resistivity Hall system for characterization of thin films.

SELECTED PUBLICATIONS

LIGO Scientific and Virgo collaborations. **GWTC-1: A Gravitational-Wave Transient Catalog of Compact Binary Mergers Observed by LIGO and Virgo during the First and Second Observing Runs.** 2018

LIGO Scientific, Virgo, and more than fifty EM observer collaborations. **Multi-messenger Observations of a Binary Neutron Star Merger.** *The Astrophysical Journal Letters*, 848(2):L12, 2017

LIGO Scientific and Virgo collaborations. **GW170817: Observation of Gravitational Waves from a Binary Neutron Star Inspiral.** *Phys. Rev. Lett.*, 119:161101, Oct 2017

LIGO Scientific and Virgo collaborations. **Calibration of the Advanced LIGO detectors for the discovery of the binary black-hole merger GW150914.** *Phys. Rev. D*, 95:062003, Mar 2017

C. Cahillane, J. Betzwieser, D. A. Brown, et al. **Calibration uncertainty for Advanced LIGO's first and second observing runs.** *Phys. Rev. D*, 96:102001, Nov 2017

D. Tuyenbayev, S.Karki, J. Betzwieser, et al. **Improving LIGO calibration accuracy by tracking and compensating for slow temporal variations.** *Classical and Quantum Gravity*, 34(1):015002, 2017

LIGO Scientific and Virgo collaborations. **Observation of Gravitational Waves from a Binary Black Hole Merger.** *Phys. Rev. Lett.*, 116:061102, Feb 2016

S.Karki, D. Tuyenbayev, S. Kandhasamy, et al. **The Advanced LIGO photon calibrators.** *Review of Scientific Instruments*, 87(11):114503, 2016

B. J. Nordell, S.Karki, T. D. Nguyen, et al. **The influence of hydrogen on the chemical, mechanical, optical/electronic, and electrical transport properties of amorphous hydrogenated boron carbide.** *Journal of Applied Physics*, 118(3):035703, 2015

M. S. Driver, M. M. Paquette, S.Karki, et al. **The electronic and chemical structure of the a - $B_3CO_{0.5}H_y$ -to-metal interface from photo-emission spectroscopy: implications for Schottky barrier heights.** *Journal of Physics: Condensed Matter*, 24(44):445001, 2012

M. M. Paquette, W. Li, M. S. Driver, S.Karki, et al. **The local physical structure of amorphous hydrogenated boron carbide: insights from magic angle spinning solid-state NMR spectroscopy.** *Journal of Physics: Condensed Matter*, 23(43):435002, 2011