

# Saurabh Kumar Singh

Surface Dynamic Lab  
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## Research Experience

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### July 2020 to Present:

Doctoral Thesis work (currently ongoing): Studying collision and reaction dynamics of molecules on single crystal metal surfaces to understand elementary chemical process in surface chemistry.

#### *Design and characterization of diagnostic tools for quantum state resolved studies*

- Design and development of wavemeter with high accuracy (ppm) and high precision (ppb).
- Home built low cost stabilized Helium Neon laser (stability upto sub ppb).
- Developing a high sensitive tools (capable to detect overtone transition (in IR region) and multi-photon electronic transition (in UV) of molecules) based on photoacoustic phenomenon.
- Design and characterization of velocity map imaging setup for quantum state resolved surface scattering experiment.
- Characterizing an novel He atom source for following chemical reactions on surfaces in real time using He reflectivity.

### Previous Experience:

**MSc project:** Project on 'Synthesis and characterization of TiO<sub>2</sub> based Dye Sensitized Solar Cells (DSSC)' under the guidance of **Dr. Pankaj srivastava** at Department of Chemistry, Institute of Science BHU in December- May (2018).

**Summer Internship:** Project on studies of Corrosion under the guidance of **Dr. G. S. Mahobia** at Department of Metallurgical Engineering IIT BHU in May- June (2017) as a part of summer internship.

## Technical Skills

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- Handling and maintenance of high vacuum and ultra high vacuum chambers and associated equipment

- Handling and maintenance of Pulsed Nd Yag Lasers, injection seeders, dye lasers, external cavity diode lasers
- HITRAN: High resolution spectroscopic simulation
- CAD design: Designing of vacuum chamber and its components
- SIMION 8.0: Ion trajectories simulations
- SimScale: Heat transfer simulations
- MolFlow: Vacuum chamber simulations
- LabView to automate and interface the experimental setup
- Microcontrollers: Arduino and Teensy
- Programming languages: Python, LabView, C, FORTRAN 77 and 90
- Proficiency with Word, PowerPoint, Excel and Latex

## Education

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| 2018–<br>Currently<br>ongoing | Ph.D., Chemical Science, <b>Tata Institute of Fundamental Research Hyderabad</b><br><br>Thesis Title: Dissociation dynamics of CO <sub>2</sub> on Copper surfaces<br><br>Supervisor: Pranav R Shirhatti |
| 2016–2018                     | M.Sc., Physical Chemistry, with a CGPA of 8.58/10, <b>Banaras Hindu University</b>  |
| 2012–2015                     | B.Sc (Hons.), Chemistry, with a CGPA of 7.7/10, <b>Banaras Hindu University</b>   |

## Scholastic Achievements

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- Secured All India Rank of 27 in CSIR UGC NET exam 2017
- Secured an All India Rank of 71 in BHU-PET 2013
- Selected as Associates (Teaching) in Azim Premji Foundation through campus placement

## Conferences / Worksops

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- Presented poster on '*Design and development of diagnostic tools for quantum state specific studies*' in 'conference on Spectroscopy and Dynamics of Molecules and Clusters (SDMC-2022), November 10-13, 2022.

- Presented poster on '*Design and development of diagnostic tools for quantum state specific studies*' in 'In-house symposium TIFR Hyderabad', September 15-17, 2022.
- Presented poster on '*Designing and development of low cost wavemeter with high accuracy (1 GHz, 0.03 cm<sup>-1</sup>) for pulse lasers*' in 'TIFR Annual Chemistry conference' (TACC 2020), March 03-05, 2021.
- Attended in 'Student Conference on Optics and Photonics (SCOP 2020)', September 23-25, 2020.

## Publications

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Preprint URLs available at <https://orcid.org/0000-0002-2760-9671>

- Saurabh Kumar Singh, Avinash Kumar, Pranav R. Shirhatt, Design and characterization of a high performance (0.01 ppm precision, 1 ppm accuracy) low-cost wavemeter (Under consideration for patent application).
- Singh, Saurabh Kumar, Avinash Kumar, and Pranav R. Shirhatti. "A simple and low-cost setup for part per billion level frequency stabilization and characterization of red He-Ne laser." arXiv preprint [arXiv:2202.09577](https://arxiv.org/abs/2202.09577) (2022).
- Taur, Amaraja, Saurabh Kumar Singh, and Pranav Ravindra Shirhatti. "Identifying signatures of thermal and non-thermal reaction pathways in plasmon induced H<sub>2</sub>+ D<sub>2</sub> exchange reaction." <https://doi.org/10.26434/chemrxiv-2021-87t1c-v2> (2021).
- Geetika Bhardwaj, Saurabh Kumar Singh, Pranav R. Shirhatti, Cascaded collimator based compact He atom source for real time measurement of chemical reactions using He reflection (In preparation).
- Avinash Kumar, Saurabh Kumar Singh, Pranav R. Shirhatt, Narrow linewidth radiation source for optical pumping in IR wavelength region (In preparation)

## Personal Information

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Languages known - English, Hindi

Permanent Address - Vill - Barhaini kala, Post- Babhaniyan

Dist - Varanasi, Pin Code - 221311, UP, India

## Declaration

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I hereby declare that the above mentioned information is correct up to my knowledge and I bear the responsibility for the correctness of the above-mentioned particulars.