VANSHIKA KANSAL

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Nationality: Indian

ABOUT ME

I am an Observational astronomer, expert in gravitational weak lensing and Dark matter in galaxies, galaxy groups and cluster of galaxies. I have been using weak lensing to get the cosmic shear measurements, to the inner dark matter density profile and to link galaxies to their dark matter halos. I make extensive use of Bayesian inference methods, in order to fit complex models to a broad range of observations.

ACADEMIC EXPERIENCE

CEA | Paris-Saclay, France
Research Engineer | 11/2018 to 11/2021

- Implementation lead for 2D Mass Weak Lensing Processing Function of the ESA Euclid mission.
- Verification and Validation for 2D Mass Weak Lensing Processing Function.
- In-charge of development and integration of pipelines and Data Model in Organization Unit Level 3.
- Lead the project and/or other Engineers involved with the development and implementation.
- Worked on other processing functions and pipeline such as Photometric Visibility Mask.
- Reviewed code and Data Model for the other processing functions.
- Participated in the development of Euclid libraries and Data Model tools.

ESAC-ESA | Madrid, Spain
Research Intern (Master thesis) | 04/2018 to 08/2018

- Worked on NISP (Near Infrared Spectrometer and Photometer) instrument simulator of the ESA Euclid mission.
- Modelled and Simulated Solar System Objects in simulator Imagem.
- Performed Photometry and Astrometry to find out Flux distribution and detect moving objects respectively.
- Report: KANSAL, V. (2018). Simulation of Solar System Objects for the NISP instrument of the ESA Euclid Mission (Dissertation). Retrieved from http://urn.kb.se/resolve?urn=urn:nbn:se:ltu:diva-72221

INDUSTRIAL EXPERIENCE

esc Aerospace | Prague, Czech Republic
Intern (Summer Internship) | 07/2017 to 08/2017

- Worked on Sentinel Satellite and Demise Observation Capsule (DOC) Proto-Flight Model under the FLPP-3 program.
- Sentinel Satellite: Worked on ground station code refinement, optimise, maintenance and validation of the ground segment code.
- DOC: The general objective of DOC was to prepare the technical and programmatic elements to enable an efficient launcher design where I was responsible for DOC graphical user interface.

Sapro Robotics | Ghaziabad, India
Embedded Software Engineer | 01/2013 to 07/2016

- Worked on Design, development, installation and testing of the client-specific applications
- Performed research and development to enhance the utility of applications for existing clients
- Provided hands-on workshops to students from universities & Prepared user and self-training manuals for clients.

Aquarian Infotech Systems | Noida, India
Assistant Software Developer | 07/2011 to 08/2012

- Design, develop and implement the system requirement keeping limitations & dependencies across the modules in mind.
- Maintain, validate code and software standards.

EDUCATION

Master of Science and Technology: Space Technology and Instrumentation (M2)
Université Toulouse III - Paul Sabatier | 2017 to 2018
Toulouse, France

- Worked on Balloon project: Project concerns the measurement of physical characteristics of the Stratosphere, the flight environment, data acquisition, and the transmission of simple signals and transmission losses in the atmosphere and finally the exploitation of these data.

Master of Science: Space Technology
Luleå University of Technology | 2016 to 2018
Kiruna, Sweden

- Monitored and predicted the space weather i.e., conditions on sun & in the solar wind, Earth's magnetosphere, ionosphere thermosphere that causes Auroras and can influence the performance and reliability of space/ground based technological system and endanger human life.
  Analysed EISCAT ESR radar data, Advanced Composition Explorer (ACE) satellite, Cluster satellites and Rosetta data to work on statistics of solar wind velocity, proton density & magnetic-field components and to find out the expected energy per charge solar wind components/species.
- Implementation & Design of a floating satellite with a mission of shooting Asteroids with accuracy controlled by ground station. I was responsible to the develop the Electronics of the satellite, GUI for ground station and telemetry & tele-command with satellite using ground station. (Link: https://www.youtube.com/watch?v=2QIhp2wkuzY)

Master in Technology: Automation & Robotics
Dr. A.P.J. Abdul Kalam Technical University | 2013 to 2015
India

- Developed a wireless interface to control an arm using gesture of human being which can be operated through a range of 10 to 90 meters.
- Worked on Pneumatics & Hydraulics systems and PLCs with BOSCH Rexorth and simulated the Pneumatics & Hydraulics designs with different PLCs in Automation Studio (Famic Technologies).
- Worked on KUKA Industrial robot control systems.
- Programmed and documented the robust LabVIEW applications.

Master of Business Administration: Information Technology
Sikkim Manipal University Distance Education | 2012 to 2013
India

- Selected Coursework: Business Communication, Statistics for Management, Research methodology, Project Management

Bachelor's in Technology: Computer Science & Engineering
Dr. A.P.J. Abdul Kalam Technical University | 2007 to 2011
India

- Selected Coursework: Numerical & Statistical Techniques, Data Structure, Database management, Operating systems, Computer networks, Design & Analysis of Algorithms, Principle of Programming Languages, Digital Image processing, Distributed Systems, Artificial Intelligence

SUCCESSFUL COMPETED PROPOSALS

- Dynamics, Dark Matter, and Precision Weak Lensing (awarded time on the ANU 2.3 Telescope) | February 2023 (6 nights)
- Dynamics, Dark Matter, and Precision Weak Lensing (awarded time on the ANU 2.3 Telescope) | September 2022 (6 nights)
- Better Weak Lensing through Integral Field Spectroscopy (awarded time on the ANU 2.3 Telescope) | May 2022 (4 nights)

ASTRONOMICAL OBSERVATIONS

- February 2023 (6 night) | Siding Spring Observatory, Australia **[11k AUD]**
  Instrument: ANU 2.3m Telescope with Wide Field Spectrograph (WiFeS)
- October 2022 (1 night) | W. M. Keck Observatory, Hawaii **[150k USD]**
  Instrument: 10m Telescope with Deep Imaging Multi-Object Spectrograph (DEIMOS)
- September 2022 (6 nights) | Siding Spring Observatory, Australia **[11k AUD]**
  Instrument: ANU 2.3m Telescope with Wide Field Spectrograph (WiFeS)
- May 2022 (4 nights) | Siding Spring Observatory, Australia **[8k AUD]**
  Instrument: ANU 2.3m Telescope with Wide Field Spectrograph (WiFeS)

GRANTS AND FUNDING

- Research Fellowship from ARC Centre of Excellence for Dark Matter Particle Physics [3yr; **100K AUD**], 2022-2025
- Erasmus+ grant, [1yr; **6k €**], 2017-2018

ACKNOWLEDGEMENTS

- Judged the Indian Robot Olympiad (IRO) in Regular category for Delhi-NCR Regional Competition, 2013
- Judged the Indian Robot Olympiad (IRO) in Regular category for National Final Competition, 2013
- Winning Team member of VOGUE during Thomso'07 held at IIT, ROORKEE.
- Won several awards for Sketching at regional level, India.

INVITED TALKS AND LECTURES

- Lecture on "Data Model and Bindings" in Euclid Developer's workshop 7 (Virtually, October 5-8, 2020).
- Lectures on "C++ programming language" during Euclid Language workshop (~6h) at IAP, Paris, France (November 12-19, 2019).
- Talk on "Euclid Development Environment" in Euclid Developer's workshop 6 at ESAC/ESA, Spain (October 15-18, 2019).
- Talk on "Wireless gesture driven robotic arm" in National conference on "Advances in Mechanical, Automobile & Production Engineering (AMAPE-2015)" at Skyline Institute of Engineering and Technology, Greater Noida, India (October 19-20, 2015).
- Lectures on "Design and Simulation of Pneumatics & Hydraulics systems and PLCs" (~8h) at AKGEC, Ghaziabad, India (2013-14)

ORGANISATIONS SKILLS

- Organisation workshops on Automation Studio (Design and Simulation of Pneumatics & Hydraulics systems and PLCs - 2013-14).
- Designed a course module for the Simulation of Pneumatics & Hydraulics systems and PLCs for Undergraduate students (2013-14).

SCIENTIFIC AND ADMINISTRATIVE RESPONSIBILITIES

- **Euclid:** Implementation lead of 2D-MASS-WL and in charge of the integration of the codes to produce the weak lensing mass maps, (2018-2021).

PROFESSIONAL MEMBERSHIPS

- **Euclid (2018-2022).**

SKILLS

- 10+ years of Programming experience in C/C++ (+98, +11 or higher and STL), Python, MATLAB, SQL, XML/XSD, bash
- 8+ years of Data Analysis Experience
- 8+ years of experience in Scientific computing
- Self-motivated and passionate for perfection and quality
- Ability to work independently and as a part of a team
- Excellent communication and organisational skills
- Trained and expert to work on different computer platforms like Windows, Linux, Mac etc.
- Capable of handling varied kinds of Microsoft packages like MS-Access, MS-Excel and other MS-Office software packages and other tools such as LabView, Qt, Eclipse, NetBeans, LaTeX, DipTrace, Automation Studio, Spenvis.
- Experience in open source developer tools such as gcc, cmake, gnu make, valgrind etc
- Extensively worked with Version Control Systems like GIT, SVN (Subversion)

DATA ANALYSIS

1. DATA:

- Multi-slit spectrographs (DEIMOS/KECK II)
- Integral field spectrographs (WiFeS/SSO-ANU 2.3)
- Flagship data (Euclid)

2. STATISTICAL AND COMPUTATIONAL TECHNIQUES:

- Multi-Scale methods
- Bayesian inference methods
- Monte Carlo Methods
- Sparse representation

SELECTED PUBLICATIONS

- Ajani, V., Baldi, M., Barthelemy, A., Boyle, A., Burger, P., Cardone, V. F., Cheng, S., Codis, S., Giocoli, C., Harnois-Déraps, J., Heydenreich, S., **Kansal, V.**, Kilbinger, M. et al. 2023 arXiv preprint arXiv:2301.12890.
- **Kansal, V.**, et al. 2023, Astronomy Astrophysics, 670, A34
- Pires, S., Vandenbussche, V., **Kansal, V.**, et al. 2020, Astronomy Astrophysics, 638, A141

CONFERENCE PROCEEDINGS

- **Kansal, V.** and Kansal, A.K., 2015. Wireless Gesture Driven Artificial Arm. ADVANCES IN MECHANICAL, AUTOMOBILE AND PRODUCTION ENGINEERING, p.37