

Dr. Ranjeet

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Research Highlights

- ✚ **Working as Assistant Prof. in Department of Physics, GJUST, Hisar since May 2017**
- ✚ **Working on the development of a new approach for the nuclear structure based on the short ranged correlated nucleons**
 - Initial results presented in Nucleus-2019, Russia and INPC-2019, UK
- ✚ **Worked on the Si sensors for Particle and Nuclear physics experiments from August 2010 to Present**
 - Ph.D. work on the investigation of radiation damage in Si sensors in HL-LHC radiation environment (Phase-II outer-tracker upgrade). Along with many other contribution, radiation damage simulation work was useful in deciding the n-on-p strip sensors as phase-II sensor polarity
 - Worked in CERN (Geneva, Switzerland) and Fermi lab (USA) about one year (in multiple visits) and performed various measurements and TCAD simulation on sensors
 - Member of the CMS Experiment (CERN) and RD-50 group (which investigates the radiation damage in Si sensors)
 - Worked for the Phase-II upgrade of CMS Tracker (CERN Lab, Geneva) and new detector designs (Low Gain Avalanche Detector, CMOS sensor, Avalanche Photo Diode with CERN and Princeton and)
 - Attended Excellence in Detector & Instrumentation Techniques Symposium (EDIT-2012) school held in Fermi National Laboratory, Batavia, USA, 13-23 February 2012
 - Published and presented research work in many international conferences (including as an invited speaker in VERTEX-2014 conference held in Prague, Czech Republic)
 - Worked as Senior Research Fellow (SRF) in University of Delhi under CMS-India Project.
 - Currently working in GJUS&T, Hisar as Assistant Prof. and developing a new nuclear structure model based on the short ranged correlations between nucleons.
- ✚ **Worked in experimental nuclear physics from January 2005 to February 2008**

- Worked on the fusion, fission and elastic scattering experiments in the Inter-University Accelerator Center (IUAC) Delhi
- Extensive experience of working with the various detectors used in the nuclear reaction experiments (Solid as well as Gas Detectors) and experimental techniques

Education

- ✚ Ph.D from the Department of Physics & Astrophysics, University of Delhi (August 2010 to March 2015) with title “**Performance Characteristics of Si Sensors at Collider Experiments**”
- ✚ Attended one year course module on “Nuclear structure and experimental techniques” from Inter-University Accelerator Center (2005-2006)
- ✚ Qualified National Eligible Test (NET with JRF) for Assistant Prof. in Indian universities (June 2004 and December 2009)
- ✚ M.Sc. Physics from the Department of Physics & Astrophysics, University of Delhi (2002 to 2004)
- ✚ B.Sc. from the Kirori Mal College, University of Delhi (1999 to 2002)

Publications

✚ Peer Reviewed Journals / International Conference Proceedings

- **Modeling of neutron radiation-induced defects in silicon particle detectors**, Chakresh Jain, Saumya Saumya, Geetika Jain, **Ranjeet Dalal**, Namrata Agrawal, Ashutosh Bhardwaj, Kirti Ranjan, **Semiconductor Science and Technology** **35** (4), **045021** (2020)
- **Precision measurement of the structure of the CMS inner tracking system using nuclear interactions**, AM Sirunyan.. **R. Dalal** et al., **Journal of Instrumentation**, **13**, **P10034** (2018)
- **Test beam demonstration of silicon microstrip modules with transverse momentum discrimination for the future CMS tracking detector**, W Adam, T Bergauer, E Brondolin, M Dragicevic, M Friedl, R Frühwirth, R.Dalal et al., **Journal of Instrumentation** **13** (03), **P03003**
- **Development of AC-coupled, poly-silicon biased, p-on-n silicon strip detectors in India for HEP experiments**, G Jain, **R Dalal**, A Bhardwaj, K Ranjan, A Dierlamm, **Nuclear Instruments and Methods in Physics Research A**, **882** (2018)
- **Characterization of irradiated APDs for picosecond time measurements**, MC Vignali, **R Dalal**, M Gallinaro, B Harrop, G Jain, C Lu, M McClish et al., **Journal of Instrumentation** **13** (01), **C01041**
- **Characterization of irradiated thin silicon sensors for the CMS phase II pixel upgrade**, W Adam, T Bergauer, E Brondolin, M Dragicevic, M Friedl, R Frühwirth, **R Dalal** et al., **The European Physical Journal C** **77** (8), **567**

- **P-Type Silicon Strip Sensors for the new CMS Tracker at HL-LHC**, W Adam, T Bergauer, E Brondolin, M Dragicevic, M Friedl, R Frühwirth, **R Dalal** et al., **Journal of Instrumentation** **12** (06), P06018
- **Dependence of charge multiplication on different design parameters of LGAD devices**, G Jain, **R Dalal**, A Bhardwaj, K Ranjan, **Journal of Instrumentation** **12** (03), C03022
- **TCAD simulation of Low Gain Avalanche Detectors**, **Ranjeet Dalal**, Ashutosh Bhardwaj, Geetika, Jain, Kirti Ranjan, *Nuclear Instruments and Methods in Physics Research A* **836** (2016) 113–121
- **Design Optimization of Pixel Sensors using Device Simulations for the Phase-II CMS Tracker Upgrade**, G. Jain, A. Bhardwaj, **R. Dalal**, R. Eber, T. Eichorn, M. Fernandez, K. Lalwani, A. Messineo, F. R. Palomo, T. Peltola, M. Printz, K. Ranjan, I. Villa, S. Hidalgo, *Frontier Detectors For Frontier Physics 13th Pisa Meeting on Advanced Detectors (Elba Conference)*, *La Biodala, Isola d'Elba (Italy)*, 24-30 May 2015. *NIM A*, Volume 824, Pages 413–416
- **Characterization of Silicon Detectors Through TCT at Delhi University**, G. Jain, K. Lalwani, **R. Dalal**, A. Bhardwaj, K. Ranjan, *Frontier Detectors For Frontier Physics 13th Pisa Meeting on Advanced Detectors (Elba Conference)*, *La Biodala, Isola d'Elba (Italy)*, 24-30 May 2015. *NIM A*, Volume 824, Pages 411–412
- **Design, Fabrication and Characterization of multi-guard ring-furnished p⁺n Silicon Strip Detectors for Future HEP Experiments**, K. Lalwani, G. Jain, **R. Dalal**, A. Bhardwaj, K. Ranjan, *Frontier Detectors For Frontier Physics 13th Pisa Meeting on Advanced Detectors (Elba Conference)*, *La Biodala, Isola d'Elba (Italy)*, 24-30 May 2015. *NIM A*, Volume 824, Pages 428–431
- **A Method to Simulate the Observed Surface Properties of Proton Irradiated Silicon Strip Sensors**, A. Bhardwaj, R. Eber, T. Eichhorn, K. Lalwani, **Ranjeet Dalal**, A. Messineo, T. Peltola, M. Printz, K. Ranjan, *16th International Workshop on Radiation Imaging Detectors*, Trieste, Italy, 22–26 June 2014, JINST, 2015, 10 C04025
- **Simulation of Irradiated Si Detectors**, **Ranjeet Dalal**, A. Bhardwaj, G. Jain, K. Lalwani, K. Ranjan, *VERTEX-2014*, Pargue (Macha Lake) Czech Republic, 15-19 September 2014, POS (Vertex-2014) 030
- **Development of Radiation Damage Models for Irradiated Silicon Sensors Using TCAD Tools** **Ranjeet Dalal**, A. Bhardwaj, R. Eber, T. Eichhorn, K. Lalwani, A. Messineo, T. Peltola, M. Printz, K. Ranjan, *Technology and Instrumentation in Particle Physics-2014 (TIPP-2014)*, Amsterdam, Netherlands, 2-6 June 2014, PoS (TIPP2014), 276 (2014).
- **Simulations of Inter-Strip Capacitance and Resistance for the Design of the CMS Tracker Upgrade**, A. Bhardwaj, R. Eber, T. Eichhorn, **Ranjeet Dalal**, K. Lalwani, A. Messineo, T. Peltola, M. Printz, K. Ranjan, *Technology and Instrumentation in Particle Physics-2014 (TIPP-2014)*, Amsterdam, Netherlands, 2-6 June 2014, PoS (TIPP-2014), 279 (2014)

- **Recent progress of the RD50 Collaboration – Development of radiation tolerant tracking detectors**, A.Affolder, Michael Moll... **Ranjeet Dalal**, Kirti Ranjan, Ashutosh Bhardwaj *et. al.* *Vertex-2013*, Lake Starnberg, Germany, 16-20 September, 2013, **PoS (Vertex-2013) 026**
- **Combined effect of bulk and surface damage on strip insulation properties of proton irradiated n⁺-p⁻ Silicon strip sensors**, **Ranjeet Dalal**, Ashutosh Bhardwaj, Kirti Ranjan, Michael Moll and Anna Elliott-Peisert, **JINST**, (2014) **Issue 9 P04007**
- **Entrance channel effect in fission of ¹⁹⁷Tl**, Hardev Singh, Ajay Kumar, Bivash R. Behera, and I. M. Govil, K. S. Golda, Pankaj Kumar, Akhil Jhingan, R. P. Singh, P. Sugathan, M. B. Chatterjee, and S. K. Datta, **Ranjeet**, Santanu Pal, G. Viesti, **Physical Review C**, **76**, **044610**
- **Role of nuclear dissipation and entrance channel mass asymmetry in precession Neutron multiplicity enhancement in fusion-fission reactions**, Hardev Singh, K. S. Golda, Santanu Pal, **Ranjeet**, Rohit Sandal, Bivash R. Behera, Gulzar Singh, Akhil Jhingan, R. P. Singh, P. Sugathan, M. B. Chatterjee, S. K. Datta, Ajay Kumar, G. Viesti, **Physical Review C**, **78**, **024609**
- **Measurement of neutron multiplicity from fission of ²²⁸U and nuclear dissipation**, Hardev Singh, B.R. Behera, Gulzar Singh, I.M. Govil, K.S. Golda, Akhil Jhingan, R.P. Singh, P. Sugathan, M.B. Chatterjee, S.K. Datta, Santanu Pal, **Ranjeet**, S. Mandal, P.D. Shidling and G. Viesti, **Phys. Rev. C** **80**, **064615**.
- **Interaction of loosely bound radioactive ⁷Be and stable ⁷Li with ⁹Be**, S. Verma, J.J. Das, A. Jhingan, K. Kalita, S. Barua, K.S. Golda, N. Madhavan, P. Sugathan, S. Nath, T. Varughese, J. Gehlot, S. Mandal, **Ranjeet**, P.K. Sahu, B. John, B.K. Nayak, V. Jha, A. Saxena, S.K. Datta, R. Singh, **Eur. Phys. J. A** **44**, **385**
- **Measurements of elastic scattering for ⁷Be, ⁷Li + ⁹Be systems and fusion cross sections for ⁷Li + ⁹Be system**, S. Verma, J. J. Das, A. Jhingan, K. Kalita, S. **Ranjeet**, P. K. Sahu, B. Jhon, B. K. Nayak, A.Saxena, S. K. Datta, R. Singh, **Eur. Phys. J. Special Topics** **150**, **75-78**

✚ CMS Internal Note (Published by CERN, Geneva)

- **Simulation of Silicon Devices for the CMS Phase II Tracker Upgrade**, A. Bhardwaj, **Ranjeet Dalal**, R. Eber, T. Peltola, T. Eichhorn, A. Messineo, M. Printz, K. Ranjan, CMS note, **CMS DN-2014/016**

✚ International Conferences Talk/Poster

- **The SRC model for nuclear structure**, Ranjeet Dalal, International Nuclear Physics Conference-2019, IOP, Glasgow, UK
- **The SRC based nuclear structure model**, Ranjeet Dalal, Nucleus 2019, Dubna Russia

- **Design Optimization of Pixel Sensors using Device Simulations for the Phase-II CMS Tracker Upgrade**, G. Jain, A. Bhardwaj, **R. Dalal**, R. Eber, T. Eichorn, M. Fernandez, K. Lalwani, A. Messineo, F. R. Palomo, T. Peltola, M. Printz, K. Ranjan, I. Villa, S. Hidalgo, poster presentation in *Frontier Detectors For Frontier Physics, 13th Pisa Meeting on Advanced Detectors* held in La Biodola, Isola d'Elba (Italy), 24-30 May 2015.
- **Characterization of Silicon Detectors through TCT at Delhi University**, G. Jain, K. Lalwani, R. Dalal, A. Bhardwaj, K. Ranjan, poster presented in *Frontier Detectors For Frontier Physics, 13th Pisa Meeting on Advanced Detectors* held in La Biodola, Isola d'Elba (Italy), 24-30 May 2015.
- **Design, Fabrication and Characterization of multi-guardring-furnished p+n Silicon Strip Detectors for Future HEP Experiments**, K. Lalwani, G. Jain, R. Dalal, A. Bhardwaj, K. Ranjan, oral presentation in *Frontier Detectors For Frontier Physics, 13th Pisa Meeting on Advanced Detectors* held in La Biodola, Isola d'Elba (Italy), 24-30 May 2015.
- **TCAD Simulations of Irradiated Si Sensors**, Ranjeet Dalal, A. Bhardwaj, G. Jain, K. Lalwani, K. Ranjan, Oral presentation in *25th RD-50 conference* held in CERN, Geneva, 19-21 November 2014.
- **Simulation of Irradiated Si Detectors**, Ranjeet Dalal, A. Bhardwaj, G. Jain, K. Lalwani, K. Ranjan, invited talk in *VERTEX-2014 conference* held in Pargue (Macha Lake) Czech Republic, 15-19 September 2014.
- **Simulations of Hadron Irradiation Effects for Si Sensors Using Effective Bulk Damage Model**, Ranjeet Dalal, A. Bhardwaj, G. Jain, K. Lalwani, K. Ranjan, Oral presentation in *24th RD-50 conference* held in Bucharest, Romania, 11-13 June 2014.
- **Development of Radiation Damage Models for Irradiated Si Sensors Using TCAD Tools**, Ranjeet Dalal, A. Bhardwaj, G. Jain, K. Lalwani, K. Ranjan, poster in *Technology and Instrumentation in Particle Physics-2014 (TIPP-2014)* held in Amsterdam, Netherlands, 2-6 June 2014.
- **Comparison of Radiation Hardness Properties of p⁺-n⁻ and n⁺-p⁻ Si Strip Sensors Using Simulation Approach**, Ranjeet Dalal, A. Bhardwaj, K. Lalwani, K. Ranjan, Oral presentation in *23th RD-50 conference* held in CERN, Geneva, 13-15 November 2014.
- **Simulations of Hadron Irradiated n⁺-p⁻ Si Strip Sensors Incorporating Bulk and Surface Damage**, Ranjeet Dalal, A. Bhardwaj, K. Lalwani and K. Ranjan, Oral presentation in *23th RD-50 conference* held in CERN, Geneva, 13-15 November 2014.
- **Techniques of Improving Electrical Characteristics of the Si Sensors Equipped with Various Isolation Methods**, Ranjeet Dalal, A. Bhardwaj, Pooja Saxena, R. K. Shivpuri and K. Ranjan, poster in *International Conference on Radiation Imaging Detectors (IWORID-2012)* held in Figuera da Foz, Coimbra, Portugal, 1-5 July 2012.
- **Silicon detector development for the proposed detectors of the future lepton colliders**, Ranjeet Dalal, A. Bhardwaj, P. Saxena, K. Ranjan, R. Shivpuri, poster presented in *XX DAE-BRNS High Energy Physics Symposium* held in Shantinikatan University, West Bengal, India, January 13-18 2013.

- **Development and Characterization of ac-coupled Si strip detectors for Nuclear & High Energy Physics Applications**, Geetika Jain, Ranjeet Dalal, Kavita Lalwani, Ashutosh Bhardwaj and Kirti Ranjan, poster in *DAE Symposium on Nuclear Physics 2014*, Banaras Hindu University, Varanasi, 07-12 December 2014
- **Transient Current Technique (TCT) Measurements & Simulations at Delhi University**, Geetika Jain, Ranjeet Dalal, KavitaLalwani, Preeti Kumari, Ashutosh Bhardwaj, Kirti Ranjan, poster in *Banaras Hindu University*
- , *Winter School*, April 2014
- **Design and Development of Radiation Hard Silicon Sensors for Future High Energy Physics Experiments**, Preeti Kumari, Kavita Lalwani, Ranjeet Dalal, Geetika Jain, Ashutosh Bhardwaj, Kirti Ranjan, poster in *Workshop for Contemporary Trends in High Energy Physics and Experimentation (WCTHEP)*, Chandigarh, 10-11 March 2014
- **Simulation of Double Peak Structure of Electric Field for Irradiated Si-Sensors**, Kavita Lalwani, Ranjeet Dalal, K. Ranjan, A. Bhardwaj, & R. K. Shivpuri, poster in conference *Triggering Discoveries in High Energy Physics*, University of Jammu, 9-14 September 2014

✚ National Conferences/Schools

- SERC School on Nuclear Dynamics at low and medium energies which was held at Variable energy cyclotron center (VECC), Kolkatta, India from 13th March to 2nd April 2006
- DAE-BRNS Workshop on Superconductor-cyclotron facility of VECC which was held at Variable energy cyclotron center, Kolkatta, India, 11-14 November 2007.
- Presented Paper on “Fusion reaction around Coulomb barrier between ⁴⁰Ca and Zn isotopes” in DAE-2007 on Nuclear & Particle physics in Sambalpur University, Orissa, India in December 2007.

Teaching Experience

✚ Post Graduate level

- M.Sc. Physics in GJUS&T, Hisar, since 22 May 2017
- M.Sc. physics in **A.I.J.H.M College, Rohtak** from 22/8/2008 to 26/8/2009.

✚ Under Graduate level

- **Acharya Narender Dev College of Delhi University** from 26/8/2009 to 26/7/2010.

Skills

- ✚ Extensive experience in Si sensor simulation and radiation damage modeling due to different type of radiation.
- ✚ Experience in various measurement techniques/set-ups used for the quality checks as well as for the radiation damage investigation of Si sensors
- ✚ Experience with experimental techniques like high vacuum techniques, nuclear target fabrication (by resistive heating and electron gun methods), nuclear physics/high energy physics electronics (which include data acquisition under various logical conditions etc.)

- ✚ Experience in various type of sensors handling which includes gamma ray detectors (HPGe, Clover, NAI(Tl), BaF₂, BGO & various plastic detectors) charge particle detectors (Si(Li), SSBD, MWPC, Ionization Chamber, and organic detectors) and neutron detectors (various plastic detectors, TOF setup).
 - ✚ Mathematica Tool
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