

VIJAY KUMAR

PH.D. RESEARCHER · (HADRONIC STRUCTURE STUDIES)

Department of Physics

University of Regina, Regina, Saskatchewan, Canada

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Education

University of Regina

DOCTOR OF PHILOSOPHY (PH.D. PHYSICS)

- Ph.D. supervisor: Prof. Garth Huber

3737 Wascana Parkway Regina,
SK S4S 0A2, Canada.

Degree Expected Fall 2023

Indian Institute of Technology (IIT) Ropar

MASTER OF SCIENCE (M.Sc. PHYSICS)

- M.Sc. supervisor: Prof. Pushpendra P. Singh

Nangal Rd, Hussainpur,
Rupnagar, Punjab 140001, India.

2015 - 2017

Dr. Bhimrao Ambedkar University Agra

BACHELOR OF SCIENCE (B.Sc.)

- Subjects: Physics, Chemistry & Mathematics

Paliwal Park, Park Rd, Agra,
Uttar Pradesh 282004, India.

2010 - 2013

Ph.D. Thesis Research

My Ph.D. thesis research is involved in the better understanding of hadrons structures, the building-blocks of matter, using high quality electron beam and highly sophisticated magnetic spectrometers. Thomas Jefferson National Accelerator Facility is located in Newport News, Virginia, USA. This facility is also known as Jefferson Lab or JLab. There are four experimental Halls, Hall A, Hall B, Hall C and Hall D, at Jefferson Lab where experiments are conducted. The Hall C is designed for high luminosity and exclusive experiments. Recently, we conducted two experiments, the KaonLT (E12-09-011) and the PionLT (E12-19-006), in the experimental Hall C. The KaonLT experimental data were successfully acquired over fall 2018 and spring 2019. While the PionLT experimental data were acquired in three phases, summer 2019, fall 2021 and summer 2022. As far as my Ph.D. thesis research is concerned, I am analyzing the experimental data for the pion and kaon electromagnetic form factors at low Q^2 , i.e., at $Q^2 = 0.38$ and 0.42 GeV^2 in the PionLT experiment and at $Q^2 = 0.5 \text{ GeV}^2$ in the KaonLT experiment. The “Rosenbluth separation technique” will be utilized to separate out the cross-section parts of the pion and kaon electroproductions. The experimental Hall C and the proposed experiments details can be found at <https://www.jlab.org/physics/hall-c>.

Professional Experience

2019-2023 **Teaching Assistant 2 (TA2)**, Department of Physics, University of Regina, Regina, SK, Canada

2017-2018 **Junior Research Fellow (JRF)**, Department of Physics, Banaras Hindu University, Varanasi, India.

Publications

PUBLICATIONS IN REFEREED JOURNALS

R. Li, N. Sparveris, H. Atac, M. K. Jones, M. Paolone, Z. Akbar, C. Ayerbe Gayoso, V. Berdnikov, D. Biswas, M. Boer, A. Camsonne, J.-P. Chen, M. Diefenthaler, B. Duran, D. Dutta, D. Gaskell, O. Hansen, F. Hauenstein, N. Heinrich, W. Henry, T. Horn, G. M. Huber, S. Jia, S. Joosten, A. Karki, S. J. D. Kay, **V. Kumar**, X. Li, W. B. Li, A. H. Liyanage, S. Malace, P. Markowitz, M. McCaughan, Z.-E. Meiziani, H. Mkrtchyan, C. Morean, M. Muhoza, A. Narayan, B. Pasquini, M. Rehfuss, B. Sawatzky, G. R. Smith, A. Smith, R. Trotta, C. Yero, X. Zheng & J. Zhou

Nature (2022) <https://doi.org/10.1038/s41586-022-05248-1>

K. Mondal, A. Chakraborty, A. K. Mandal, U. S. Ghosh, Aniruddha Dey, Saumyajit Biswas, B. Mukherjee, S. Rai, S. Chatterjee, S. K. Das, S. Samanta, R. Raut, S. S. Ghugre, S. Bhattacharyya, S. Nandi, S. Bhattacharyya, G. Mukherjee, S. Ali, A. Goswami, S. Mukhopadhyay, Krishichayan, R. Banik, R.Chakrabarti, **V. Kumar** and A. Kumar

Physical Review C 105, 034328 (2022).

A. K. Mondal, A. Chakraborty, K. Mandal, U. S. Ghosh, Aniruddha Dey, Saumyajit Biswas, B. Mukherjee, S. Rai, Krishichayan, S. Chatterjee, S. K. Das, S. Samanta, R. Raut, S. S. Ghugre, S. Rajbanshi, R. Banik, S. Bhattacharyya, S. Nandi, S. Bhattacharya, G. Mukherjee, S. Ali, A. Goswami, R.Chakrabarti, S. Mukhopadhyay, A.K. Sinha, **V. Kumar** and A. Kumar

Physical Review C 102, 064311 (2020).

ARTICLES SUBMITTED TO REFEREED JOURNALS

Coming soon!

OTHER PUBLICATIONS

I. Ahmed et al., **DAE Symp. Nucl. Phys. 62 1078 (2017).**

Technical Reports

Vijay Kumar, Ph.D. SUPERVISORY COMMITTEE REPORT, October 21, 2022.

<https://logbooks.jlab.org/entry/3926847>

Vijay Kumar, Ph.D. SUPERVISORY COMMITTEE REPORT, October 13, 2021.

<https://logbooks.jlab.org/entry/3926847>

Vijay Kumar, UPDATED SHMS HGC CALIBRATION CODE, November 11, 2020.

<https://hallcweb.jlab.org/doc-private/ShowDocument?docid=1098/>

Vijay Kumar, Ph.D. SUPERVISORY COMMITTEE REPORT, September 2, 2020.

<http://lichen.phys.uregina.ca/>

Awards & Fellowships

10/25/2021	Faculty of Graduate Studies and Research Thesis Only Scholarship, University of Regina	\$ 677.50
09/08/2021	UR Graduate Scholarship, Physics Department, University of Regina	\$ 3,100.00
09/14/2020	UR Graduate Scholarship, Physics Department, University of Regina	\$ 2,240.00
03/18/2020	UR Graduate Scholarship, Physics Department, University of Regina	\$ 1,400.00
01/24/2020	Canadian Institute of Nuclear Physics Travel Award, CINP	\$ 600.00
01/20/2020	Faculty of Graduate Studies and Research Thesis Only Scholarship, University of Regina	\$ 992.00
01/20/2020	UR Graduate Scholarship, Physics Department, University of Regina	\$ 5,666.67
01/29/2019	UR Graduate Scholarship, Physics Department, University of Regina	\$ 2,000.00

Presentations

CONTRIBUTED PRESENTATIONS

Vijay Kumar “Ph.D. SUPERVISORY COMMITTEE UPDATE 2022” (October 21, 2022)

Vijay Kumar et al., “KaonLT (E12-09-011) Analysis Update”, Hall A/C User Meeting (hybrid June 16-17, 2022)

<http://lichen.phys.uregina.ca>

Vijay Kumar “Ph.D. SUPERVISORY COMMITTEE UPDATE 2021” (October 13, 2021)

Vijay Kumar et al., “Update on the Kaon LT Experiment”, Hall A/C User Meeting (online July 8-9, 2021)

<http://lichen.phys.uregina.ca>

Vijay Kumar et al., “The Charged Kaon Electromagnetic Form Factor at Jefferson Lab”, CAP Congress 2021 (online June 9-10, 2021)

<http://lichen.phys.uregina.ca>

Vijay Kumar “Ph.D. SUPERVISORY COMMITTEE UPDATE 2020” (September 2, 2020)

Vijay Kumar et al., “Kaon Electromagnetic Form Factor”, Winter Nuclear and Particle Physics Conference (WNPPC February 13 -16, 2020) at Banff, Alberta, Canada.

http://lichen.phys.uregina.ca/index_files/talks/kumar_WNPPC2020.pdf

Vijay Kumar et al., “Kaon L-T experiment”, Winter Nuclear and Particle Physics Conference (WNPPC February 14 -17, 2019) at Banff, Alberta, Canada.

http://lichen.phys.uregina.ca/index_files/talks/kumar_WNPPC2019.pdf

Research Experience

University of Regina & Jefferson Lab

Regina, SK, Canada & Newport

News, Virginia, USA.

Fall 2018 - Present

PROF. GARTH HUBER

- Ph.D. thesis focused on the Kaon LT and the PionLT experiments at low Q^2 .
- Currently, analyzing experimental data using the ROOT, PYTHON and C++.
- Presenting progresses on the data analysis to the research group frequently.
- Took experimental data for our experiment too.
- Participating in data taking in other experiments in the Hall C at Jefferson Lab.
- Responsible for backing up experimental data and online analysis records on wiki and redmine.

Joint Institute for Nuclear Research (JINR)

Dubna, Russia.

PROF. AJAY KUMAR TYAGI

26 Jan - 25 Mar 2018

- Performed the calibration analyses using the ROOT and C++ of the “Tagged Neutrons and Gamma Rays setup” in the Frank Laboratory of Neutron Physics at JINR, Dubna, Russia. This visit was sponsored by the Indo-Russian joint research project awarded to Prof. Ajay Kumar Tyagi by the DST, Government of India and the RFBR, Russia at the Department of Physics, Banaras Hindu University, Varanasi, India.

IIT Ropar

Nangal Rd, Hussainpur,

Rupnagar, Punjab 140001, India.

2016-2017

PROF. PUSHPENDRA P. SINGH

- M.Sc. research project was carried out on the characterization of High Purity Germanium (HPGe) detectors, and analyzed the natural background experimental data using the RadWare software package. This work was conducted to understand the amount of natural background radiation inside the laboratory at IIT Ropar for the future study of neutrinoless double beta decay.

IIT Ropar

Nangal Rd, Hussainpur,

Rupnagar, Punjab 140001, India.

2016-2017

PROF. ASOKA BISWAS

- A short summer research project was performed on the calculations of the absorption and decay probabilities of the two level quantum system using the MATLAB computer code for the laser applications.

Outreach & Professional Development

SERVICE AND OUTREACH

08/02/2020 IIT ROPAR ALUMNI ASSOCIATION, Speaker, TOPIC: PRE & POST MASTERS: WHAT, HOW & WHEN?