

Mustafa M. Rajabali

Curriculum Vitae

- contact** Department of Physics and Astronomy
University of Tennessee - Knoxville
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email: mustafa.rajabali@gmail.com
webpage: web.utk.edu/~mrajabal
- citizenship** Kenya
- research interests** Nuclear structure and detector development for decay spectroscopy.
- education**
- PhD, Nuclear Physics* **August 2009**
University of Tennessee, Knoxville, Tennessee USA
Thesis Topic: Beta-decay and isomer studies around ^{78}Ni
Advisor: Dr. Robert Grzywacz
Area of Study: Nuclear structure and decay spectroscopy
- M.S., Condensed Matter Physics* **August 2005**
University of North Dakota, Grand Forks, North Dakota USA
Thesis Topic: Neutron and x-ray diffraction studies on praseodymium and neodymium rare earth phosphate glasses
Advisor: Dr. Kanishka G. Marasinghe
Area of Study: Neutron and x-ray scattering on amorphous material
- B.A., Physics* **May 2003**
Concordia College, Moorhead, Minnesota USA
Minor in Chemistry and Mathematics
Advisor: Dr. Bryan Luther
Research Experience for Undergraduates (REU) at National Superconducting Cyclotron Laboratory (NSCL) at Michigan State University (MSU), building and developing the Modular Neutron Array (MoNA).
- other schools & workshops**
- 15th Euro School on Exotic Beams* **September 2008**
Piaski, Poland
- 6th Summer School on Exotic Beam Physics* **August 2007**
Michigan State University, East Lansing, USA
- Best practices in teaching* **September 2006**
University of Tennessee, Knoxville, USA
- Neutron and X-ray school* **July 2004**
Argonne National Laboratory, Chicago, USA

**awards,
honors
&
activities**

University of North Dakota	
Graduate Association of Physicists - founder and organizer	2004-2005
Society of Physics Students (SPS) - president	2004-2005
Student Leaders International - selected member	2004-2005
Concordia College	
Recipient of Concordia centennial scholarship	2002-2003
Recipient of Ough family scholarship	2001-2002
Team member of Concordia college cycling team	2001-2003
Member of Circle K International	
Member of American Physical Society (APS)	
Nairobi School (High school)	
Best Science Student award	1998 & 1999
Best Physics Student of the year award	1997 & 1998

**research &
academic
experience**

University of Tennessee Graduate Student (PhD)

Experimental nuclear physics

September 2006 - Present

- Study of nuclear structure through beta and gamma decay spectroscopy on nuclei around doubly magic ^{78}Ni and ^{100}Sn . Experiments conducted at the National Super-conducting Cyclotron Laboratory (Michigan State University) and at Holifield Radioactive Ion Beam Facility (Oak Ridge National Laboratory). Major contribution in designing and developing the detector systems, developing and implementing analysis code, and implementing digital electronics acquisition system.
- Study of nanosecond isomers in neutron rich Zn and Cu isotopes. Major contribution in designing and developing a Dual Micro Channel plate (MCP) detector system in conjunction with four germanium Clover detectors in the CARDS array geometry.

Study of Superacids

August 2005 - May 2006

- Study of structural changes in superacids (HF and FSO₃H) with different concentration of water. Experiments conducted at Argonne National Laboratory (Argonne, IL, USA) at the IPNS and APS facilities using neutron and x-ray diffraction on liquids. Synthesis of fluorinated compounds was done using high vacuum fluorine lines at the University of Tennessee. Incorporated use of NMR spectroscopy in atomic structure analysis.

Graduate teaching assistant

August 2005 - August 2006

- Taught and evaluated the undergraduate physics laboratory course for first year engineering students with a one-hour course lecture prior to each laboratory session.
- Held tutoring sessions for undergraduate physics students.

University of North Dakota Graduate Student (M.S.)

Condensed matter physics

August 2003 - May 2005

- Determining local and intermediate structure of amorphous materials (glass and liquid) using X-ray and neutron diffraction techniques. Experiments were conducted at Argonne National Laboratory (Argonne, IL, USA). Incorporated use of IR and Raman spectroscopy in atomic structure analysis.

Graduate teaching assistant

August 2003 - May 2004

- Developed, implemented, and evaluated the undergraduate physics laboratory course for aviation students
- Held tutoring sessions for undergraduate physics students.

Concordia College Undergraduate (B.A)

Experimental nuclear physics

June 2002 - July 2003

- Built and tested part of the Modular Neutron Array (MoNA) at the National Superconducting Cyclotron Laboratory. Conducted the first radio active beam experiment to investigate ^8Li breakup using part of the MoNA detector.

Physical chemistry

September 2001 - May 2002

- Theoretical research on Factorized Time Correlated diagrams (FTC) relating to noisy-light. (Programming in Mathematica)

Laboratory teaching assistant

January 2002 - May 2003

- Assisted in beginner-level undergraduate physics laboratory setup and teaching.
- Held tutoring sessions for first and second year physics students.

technical skills

Extensive hardware experience with silicon detectors, germanium detectors, plastic scintillator detectors, MCP detectors, digital and analog electronics. Proficient in software design in C, Fortran and C++.

Programming: C, C++, Fortran, UNIX shell scripting

Applications: \LaTeX , \BibTeX , Mathematica, Matlab, Origin, AutoCAD, Microsoft Office, and other common productivity packages for Windows, OS X, and Linux platforms

Operating Systems: Linux, Windows, VMS

languages

English(fluent), Swahili(fluent), Gujrati(spoken), Urdhu(spoken), Hindi(spoken), French(functional), German(beginner)

list of publications

1. Decay studies on neutron rich $^{71-73}\text{Co}$ isotopes

M. M. Rajabali, R. Grzywacz, S. N. Liddick, C. Mazzocchi, J. C. Batchelder, T. Baumann, C. R. Bingham, I. G. Darby, T. N. Ginter, S.V. Ilyushkin, M. Karny, W. Królas, P. F. Mantica, K. Miernik, M. Pfützner, K. P. Rykaczewski, D. Weisshaar, J. A. Winger
In preparation

2. Decay studies of $^{73,74}\text{Ni}$ isotopes

M. M. Rajabali, R. Grzywacz, S. N. Liddick, C. Mazzocchi, J. C. Batchelder, T. Baumann, C. R. Bingham, I. G. Darby, T. N. Ginter, S.V. Ilyushkin, M. Karny, W. Królas, P. F. Mantica, K. Miernik, M. Pfützner, K. P. Rykaczewski, D. Weisshaar, J. A. Winger
In preparation

3. Two-Proton Correlations in the Decay of ^{45}Fe

K. Miernik, W. Dominik, Z. Janas, M. Pfützner, L. Grigorenko, C. R. Bingham, H. Czyrkowski, M. Cwiok, I. G. Darby, R. Dabrowski, T. Ginter, R. Grzywacz, M. Karny, A. Korgul, W. Kusmierz, S. N. Liddick, M. Rajabali, K. Rykaczewski, and A. Stolz
Phys. Rev. Lett. 99, 192501 (2007)

4. First observation of beta-delayed three-proton emission in ^{45}Fe

K. Miernik, W. Dominik, Z. Janas, M. Pfützner, C. R. Bingham, H. Czyrkowski, M. Cwiok, I. G. Darby, R. Dabrowski, T. Ginter, R. Grzywacz, M. Karny, A. Korgul, W. Kusmierz, S. N. Liddick, M. Rajabali, K. Rykaczewski, and A. Stolz
Phys. Rev. C 76, 041304 (2007)

5. Construction of a modular large-area neutron detector for the NSCL

T. Baumann, J. Boike, J. Brown, M. Bullinger, J. P. Bychoswki, S. Clark, K. Daum, P. A. DeYoung, J. V. Evans, J. Finck, N. Frank, A. Grant, J. Hinnefeld, G. W. Hitt, R. H. Howes, B. Isselhardt, K. W. Kemper, J. Longacre, Y. Lu, B. Luther, S. T. Marley, D. McCollum, E. McDonald, U. Onwuemene, P. V. Pancella, G. F. Peaslee, W. A. Peters, M. Rajabali, J. Robertson, W. F. Rogers, S. L. Tabor, M. Thoennessen, E. Tryggestad, R. E. Turner, P. J. VanWylen, N. Walker
Nucl. Inst. and Meth. A 543 (2005) 527

conference
proceedings

1. Studies of Charged Particle Emission in the Decay of ^{45}Fe

K. Miernik, W. Dominik, Z. Janas, M. Pfuetzner, L. Grigorenko, C. Bingham, H. Czyrkowski, M. C'wiok, I. Darby, R. Dabrowski, T. Ginter, R. Grzywacz, M. Karny, A. Korgul, W. Kusmierz, S. Liddick, M. Rajabali, K. Rykaczewski, A. Stolz
Acta Physica Polonica B 39 2 (2008) 477

2. Decay Studies of Very Neutron Rich Nuclei Near ^{78}Ni

J.A. Winger, S.V. Ilyushkin, A. Korgul, C.J. Gross, K.P. Rykaczewski, J.C. Batchelder, C. Goodin, R. Grzywacz, J.H. Hamilton, W. Krolas, S.N. Liddick, C. Mazzocchi, C. Nelson, S. Padgett, A. Piechaczek, M.M Rajabali, D. Shapira, E.F. Zganjar
Acta Physica Polonica B 39 2 (2008) 525

3. Neutron Single Particle States and Isomers in Odd Mass Nickel Isotopes Near ^{78}Ni

M. M. Rajabali, R. Grzywacz, S. N. Liddick, C. Mazzocchi, J. C. Batchelder, T. Baumann, C. R. Bingham, I. G. Darby, T. N. Ginter, S.V. Ilyushkin, M. Karny, W. Królas, P. F. Mantica, K. Miernik, M. Pfützner, K. P. Rykaczewski, D. Weisshaar, J. A. Winger
Fourth International Conference on Fission and Properties of Neutron-Rich Nuclei, Conference Proceedings (2008) 679

4. Weakening of the ^{78}Ni Core for $Z>28$, $N>50$?

J.A. Winger, S.V. Ilyushkin, C.J. Gross, K.P. Rykaczewski, J.C. Batchelder, R. Grzywacz, J.H. Hamilton, S.N. Liddick, S. Padgett, M.M Rajabali, D. Shapira, E.F. Zganjar
Fourth International Conference on Fission and Properties of Neutron-Rich Nuclei, Conference Proceedings (2008) 663

5. Imaging nuclear decays with Optical Time Projection Chamber

K. Miernik, W. Dominik, Z. Janas, M. Pfützner, C. Bingham, H. Czyrkowski, M. Cwiok, I. Darby, R. Dabrowski, A. Fomitchev, T. Gintei, M. Golovkov, R. Grzywacz, M. Karny, A. Korgul, W. Kusmierz, S. Liddick, M. Rajabali, A. Rodin, K. Rykaczewski, S. Stepantsov, R. Slepniev, A. Stolz, G. M. Ter-Akopian, and R. Wolski
AIP Conf. Proc. 961, (2007) 307

6. Decay Spectroscopy of ^{45}Fe

M. Pfützner, K. Miernik, W. Dominik, Z. Janas, L. Grigorenko, C. R. Bingham, H. Czyrkowski, M. Cwiok, I.G. Darby, R. Dabrowski, T. Ginter, R. Grzywacz, M. Karny, A. Korgul, W. Kusmierz, S. N. Liddick, M. Rajabali, K. Rykaczewski, and A. Stolz
AIP Conf. Proc. 961, (2007) 81

7. Beta-Decay Studies of Neutron-Rich Cu and Ga Isotopes at the HRIBF

J.A. Winger, S.V. Ilyushkin, C.J. Gross, K.P. Rykaczewski, J.C. Batchelder, R. Grzywacz, J.H. Hamilton, S.N. Liddick, S. Padgett, M.M Rajabali, D. Shapira, E.F. Zganjar
23rd International Nuclear Physics Conference (2007) 293

8. Large β -delayed neutron emission probabilities in the ^{78}Ni region

J. A. Winger, S. V. Ilyushkin, K. P. Rykaczewski, C. J. Gross, J. C. Batchelder, C. Goodin, R. Grzywacz, J. H. Hamilton, A. Korgul, W. Krolas, S. N. Liddick, C. Mazzocchi, S. Padgett, A. Piechaczek, M. M. Rajabali, D. Shapira, E. F. Zganjar, and I. N. Borzov
Accepted, in print

references

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