Matthew Mumpower

Curriculum Vitae

Los Alamos National Lab
MS B283
TA-3, Bldg 123
Los Alamos, NM 87544
mumpower@lanl.gov
www.matthewmumpower.com

Education

2007–2012	**Ph.D. Nuclear Astrophysics**, *North Carolina State University*, Raleigh, NC.
2003–2007	**B.S. Physics**, *North Carolina State University*, Raleigh, NC.
2003–2007	**B.S. Applied Mathematics**, *North Carolina State University*, Raleigh, NC.

Ph.D. Thesis

title	*The Rare Earth Peak : An Overlooked r-Process Diagnostic*
supervisor	Gail McLaughlin
overview	The r-process is the sequence of nuclear reactions responsible for approximately half the heaviest elements in the universe. We explore the mechanisms by which the rare earth nuclei are formed during the r-process. We find that nuclear data, including neutron capture rates and neutron separation energies, influence not only the final shape of the peak but also when it forms. Using new and independent constraints on the r-process we isolate astrophysical conditions favorable for elemental production in this region. We show that influential rare earth nuclei lie 10-15 neutrons from stability. These nuclei could potentially be measured in future radioactive beam facilities.

Employment

2017–present	**Staff Scientist**, *LANL*, Los Alamos, NM.
2015–2017	**Postdoctoral Researcher**, *LANL*, Los Alamos, NM.
2012–2015	**JINA Postdoctoral Fellow**, *ND*, Notre Dame, IN.
2008–2012	**Research Assistant**, *NCSU*, Raleigh, NC.
2007–2008	**Teaching Assistant**, *NCSU*, Raleigh, NC.
2005 (summer)	**Research Assistant**, *University of Chicago*, Chicago, IL.
2004–2006	**Teaching Assistant**, *NCSU*, Raleigh, NC.

Funding

2020–2022	**$330k / year**, *PI*, Low Energy Fission Dynamics, LDRD.
2020–2021	**$75k / year**, *PI*, Nuclear Data in the Era of FRIB, LDRD.
2016–2021	**$xM / year**, *Co-PI*, Fission In R-process Elements collaboration.
2019–2021	**$xM / year**, *Co-I*, Nucleosynthesis Probes of Cosmic Explosions, LDRD.
2020–2021	**$55k / year**, *PI*, Nuclear data for astrophysics in the era of FRIB, LDRD.
2019–2020	**$60k / year**, *PI*, Los Alamos CSES student fellowship for Sprouse, LDRD.

Postdocs Mentored

2020–present	**Trevor Sprouse**, *LANL*, Low energy fission dynamics.
2019–present	**Wendell Misch**, *LANL*, Isomers and neutrinos in nuclear astrophysics.
2016–present	**Nicole Vassh**, *ND*, Reverse engineering nuclear properties using astrophysical observations.
2017–2020	**Marc Verriere**, *LANL*, Fission yields in the microscopic macroscopic approach.
2017–2019	**Patrick Jaffke**, *LANL*, FRLDM fission yields across the chart of nuclides.
2017	**Kemper Talley**, *ORNL*, Neutron-γ compeition for β-delayed neutron emission.

Graduate Students Mentored

2021 summer	**Garrett King**, *WUSL*, Machine learning & nuclear reactions.
2021 summer	**Nick Poole**, *ND*, Nuclear reactions & nuclear data.
2019–present	**Yukiya Saito**, *TRIUMF*, Machine learning & nucleosynthesis.
2019–present	**Kelsey Lund**, *NCSU*, Heavy element formation in the r-process.
2016–2020	**Trevor Sprouse**, *ND*, PRISM: A reaction network framework for nuclear astrophysics.
2018–2020	**Yonglin Zhu**, *NCSU*, Nuclear physics impact on kilonova light curves.
2016–2020	**Erika Holmbeck**, *ND*, Fission in the r-process and PRISM.
summer 2017	**Alex Dombos**, *MSU*, Investigation of nu-bar and its impact on fission in the r-process.

Undergraduate Students Mentored

2013–2016	**Trevor Sprouse**, *ND*, PRISM: A reaction network framework for nuclear astrophysics.
2013–2015	**Kevin Lee**, *ND*, User frontend and chart of nuclides for Notre Dame nuclear database.
2013–2015	**Tim Khouw**, *ND*, Search capabilities and API for the Notre Dame nuclear database.
2012–2015	**Patrick Fasano**, *ND*, Initial development of the Notre Dame nuclear database.
2011–2012	**Caleb Marshall**, *NCSU*, β-decays in the rare earth region of the r-process.

Undergraduate Teaching

2011-2016	**ND**, Research mentor for students.
Spring 2008	**NCSU**, *PY205*, Lab instructor for Honors Sec 251 (classical physics).
Spring 2008	**NCSU**, *PY205*, Lab instructor for Honors Sec 252 (classical physics).
Spring 2008	**NCSU**, *PY205*, Lab instructor for Honors Sec 254 (classical physics).
Fall 2007	**NCSU**, *PY201*, Lab instructor for Honors Sec 201 (classical physics).
Fall 2007	**NCSU**, *PY201*, Lab instructor for Honors Sec 202 (classical physics).
Fall 2007	**NCSU**, *PY201*, Lab instructor for Honors Sec 203 (classical physics).
Spring 2006	**NCSU**, *PY205*, Lab instructor for Honors Sec 220 (classical physics).
Spring 2006	**NCSU**, *PY205*, Lab instructor for Honors Sec 221 (classical physics).
Fall 2005	**NCSU**, *PY203*, Lab instructor for Sec 200 (modern physics).
Fall 2005	**NCSU**, *PY203*, Lab instructor for Sec 201 (modern physics).

Spring 2005	**NCSU**, *PY205*, Lab instructor for Honors SEC 200 (classical physics).
Spring 2005	**NCSU**, *MA231*, Lecture assistant (calculus).
Fall 2004	**NCSU**, *MA341*, Teaching assistant (differential equations).

Workshops & Schools

10/2019	**NFDW**, *Nuclear fission dynamics*, Kyoto, Japan.
10/2019	**NPAP**, *r-process Workshop*, Tokyo, Japan.
07/2019	**ECT***, *r-process Workshop*, Trento, Italy.
06/2019	**FIRE**, *r-process Workshop*, BNL.
04/2019	**ASU**, *r-process Workshop*, Tempe, AZ.
10/2018	**DNP**, *neutron capture Workshop*, Wiakoloa, HI.
05/2018	**FIRE**, *r-process Workshop*, Raleigh, NC.
08/2017	**FIRE**, *r-process Workshop*, LLNL.
12/2016	**FIRE**, *r-process Workshop*, Notre Dame, IN.
06/2016	**ICNT**, *r-process Workshop*, East Lansing, MI.
07/2015	**CETUP***, *Nuclear Astrophysics Workshop*, Deadwood, SD.
10/2014	**Hawaii DNP**, *Explosive Nucleosynthesis Workshop*, Waikoloa, HI (*organizer*).
09/2014	**FAIRNESS**, *FAIRNESS Workshop*, Vietri Sul Mare, Italy.
08/2014	**INT**, *INT r-Process Workshop*, Seattle, WA.
06/2014	**RIBSS**, *Radioactive Ion Beam Stweardship Retreat*, East Lansing, MI.
06/2013	**GRC**, *Gordon Research Conference Nuclear Chemistry*, New London, NH.
05/2013	**ORNL**, *β-Delayed Neutron Emission Workshop*, ORNL Oak Ridge, TN.
11/2012	**JINA**, *NAVI-JINA EoS Workshop*, NSCL East Lansing, MI.
08/2012	**NIC-XII**, *ANU Nuclei in the Cosmos School*, Canberra, Australia.
06/2011	**NNPSS**, *National Nuclear Physics Summer School*, UNC Chapel Hill, NC.
04/2011	**NRNS**, *Nuclear Reaction Network School*, Chiemsee, Germany.
07/2010	**NIC-XI**, *WE-Heraeus School: Astrophysics & The Cosmos*, Darmstadt, Germany.
06/2009	**Connecting Quarks & Cosmos**, *School On Particle Astrophysics*, Seattle, WA.
06/2009	**Workshop**, *Astrophysics & The Cosmos*, UNC Chapel Hill, NC.

Programming Experience & Computer Skills

Scientific Computing
Built multiple beowulf supercomputing clusters • Runs large scale numerical calculations • Written object oriented nuclear reaction network • Experienced open source developer • Statistical Bayesian analysis techniques • Knowledge of machine learning • Monte Carlo studies • Open source database of nuclear properties in collaboration with the JINA and the Mozilla Science Foundation built by undergraduates • high performance computing

Research Technologies
Expert in Python, Numpy, Scipy, F2py, Fortran, Matplotlib, Bash, PPSS, Latex, Gnuplot, HTML5, PHP, MVC, OOP, JSON, CSS, XML, website construction & templating languages.

Other Technologies
Fluent with Mathematica, Matlab, Android, C++, D3js, javascript, Git, SVN, jQuery, Google Protocol Buffers and MySQL.

Presentations

Invited Talks

05/2020   **FRIB**, *"Overlap of nuclear physics and nucleosynthesis"*, *East Lansing, MI*, invited talk.

04/2020   **April APS**, *" Nuclear inputs and their impact on the r-process"*, *Washington, DC*, invited talk.

11/2019   **CHINA**, *"FRLDM fission yields for r-process nucleosynthesis"*, *Beihang, China*, invited talk.

10/2019   **JAPAN**, *"Fission across the chart of nuclides and implications for the r-process"*, *Kyoto, Japan*, invited talk.

10/2019   **JAPAN**, *"Actinides at the r-process"*, *Tokyo, Japan*, invited talk.

09/2019   **ANL**, *"Recent advances in the understanding of the rapid neutron capture process"*, *Chicago, IL*, invited talk.

07/2019   **ATLAS**, *"Insights into the $N = 126$ shell closure"*, *Chicago, IL*, invited talk.

07/2019   **ECT**, *"Nuclear fission for the r-process in the era of multi-messenger observations"*, *Trento, Italy*, invited talk.

06/2019   **BNL**, *"Fission yields from the macroscopic-microscopic approach"*, *Brookhaven, NY*, invited talk.

05/2019   **Frontiers**, *"Nucleosynthesis: connecting nuclear physics to astrophysics"*, *East Lansing, MI*, invited talk.

04/2019   **ND**, *"Astrophysical aspects of r-process nucleosynthesis in neutron star mergers"*, *Notre Dame, IN*, invited talk.

04/2019   **LBNL**, *"The role of nuclear fission in r-process nucleosynthesis"*, *Berkeley, CA*, invited talk.

11/2018   **ANL**, *"Nuclear physics and neutron-rich nucleosynthesis"*, *Chicago, IL*, invited talk.

10/2018   **DNP**, *"Neutron capture rates for neutron-rich nucleosynthesis"*, *Waikoloa, HI*, invited talk.

08/2018   **NS**, *"400 MeV/u upgrade of FRIB: advantages for r-process studies"*, *East Lansing, MI*, invited talk.

08/2018   **NS**, *"Recent progress on Los Alamos nuclear structure, reaction and fission models"*, *East Lansing, MI*, invited talk.

07/2018   **FRIB**, *"Nuclear fission properties for neutron star mergers"*, *East Lansing, MI*, invited talk.

07/2018   **AWS**, *"Fission for the r-process"*, *Vancouver, Canada*, invited talk.

07/2018   **NRM**, *"Nuclear fission for the r-process"*, *Santa Fe, NM*, invited talk.

06/2018   **NRM**, *"Strenthening nuclear reaction calculations with nuclear structure input from mean-field theory"*, *Varenna, Italy*, invited talk.

05/2018   **NCSU**, *"Nuclear physics for neutron-rich nucleosynthesis"*, *Notre Dame, IN*, invited talk.

05/2018   **NCSU**, *"Overview of the status of r-process inputs"*, Raleigh, NC, invited talk.

03/2018   **INT**, *"β-delayed fission in r-process nucleosynthesis"*, INT, invited talk.

01/2018   **CEA**, *"Recent nuclear structure and reaction modeling updates at LANL"*, Paris, invited talk.

08/2017   **LANL**, *"Novel Bayesian inference techniques and their implementation at LANL"*, LANL, invited talk.

06/2017   **FIRE**, *"Neutron-induced and β-delayed fission: the final moments of r-process nucleosynthesis"*, LLNL, invited talk.

06/2017   **LANL**, *"LANL nuclear reaction and structure models: recent applications and insights"*, Los Alamos, NM, invited talk.

04/2017   **JINA-CEE**, *"Reverse engineering nuclear properties from r-process abundances"*, online seminar, invited talk.

12/2016   **FIRE**, *"Neutron-induced and β-delayed fission in the r-process"*, Notre Dame, IN, invited talk.

10/2016   **TRIUMF**, *"Nuclear physics for the rapid neutron capture process"*, Vancouver, Canada, invited talk.

09/2016   **ND2016**, *"A new model for β-delayed neutron emission and applications to the astrophysical r process of nucleosynthesis"*, Brugges, Belgium, invited talk.

06/2016   **ICNT**, *"The r-process and sensitivities to nuclear physics"*, East Lansing, MI, invited talk.

07/2015   **CETUP***, *"Nuclear physics uncertainties and the r process"*, Deadwood, SD, invited talk.

04/2015   **April APS**, *"Nuclear data sensitivities and the rapid neutron capture process"*, Baltimore, MD, invited talk.

01/2015   **LANL**, *"Towards a toolkit for nuclear astrophysics research"*, LANL Los Alamos, NM, invited talk.

09/2014   **FAIRNESS**, *"A primer on nucleosynthesis"*, Italy, invited talk.

08/2014   **CGS15**, *"Sensitivity of the r-process to nuclear physics inputs"*, Germany, invited talk.

06/2014   **RIBSS Retreat**, *"Sensitivity of the r-Process to Nuclear Physics Inputs"*, East Lansing, MI, invited talk.

05/2014   **ATLAS UGM**, *"Recent r-Process Sensitivity Studies"*, Chicago, IL, invited talk.

04/2014   **DOE-TC2014**, *"Nuclear Masses Near N=82 and Their Effects on r-Process Abundances"*, Raleigh, NC, invited talk.

04/2014   **CW2014**, *"Sensitivity of a Main r-Process to Nuclear Masses"*, Santa Fe, NM, invited talk.

09/2013   **LANL Data Group Seminar**, *"A New JINA Nuclide Database"*, LANL Los Alamos, NM, invited talk.

09/2013   **LANL Astrophysics Seminar**, *"Nuclear Masses Near N=82 and Their Effects on r-Process Abundances"*, LANL Los Alamos, NM, invited talk.

05/2012   **MSU Theory Seminar**, *"The Rare Earth Peak: An Overlooked r-Process Diagnostic"*, MSU East Lansing, MI, invited talk.

05/2012   **Notre Dame Nuclear Seminar**, *"The Rare Earth Peak: An Overlooked r-Process Diagnostic"*, Notre Dame, IN, invited talk.

Contributed Talks

12/2019 **JAPAN**, *"Superheavy elements in the rapid neutron capture process"*, *Hakone, Japan*, contributed.

10/2019 **FPY**, *"The Los Alamos fission yield evaluation pipeline'*, *Santa Fe, NM*, contributed.

05/2019 **Frontiers**, *"Fission in the r-process"*, *East Lansing, MI*, contributed.

04/2019 **APS**, *"FRLDM fission properties for the nucleosynthesis occurring in neutron star mergers"*, *Denver, CO*, contributed.

03/2019 **Workshop**, *"Fission properties for r-process nucleosynthesis"*, *Tempe, AZ*, contributed.

06/2018 **NIC2018**, *"Fission properties relevant for GW170817"*, *L'Aquila, Italy*, contributed.

05/2018 **Lab**, *"A quick overview of nuclear physics for neutron-rich nucleosynthesis"*, *Paris, France*, contributed.

06/2018 **LANL**, *"Recent progress at Los Alamos"*, *LANL*, contributed.

08/2017 **LANL**, *"Novel Bayesian inference techniques and their implementation at LANL"*, *LANL*, contributed.

11/2016 **IFCN6**, *"Properties of neutron-rich nuclei in the macroscopic-microscopic framework"*, *Sanibel Island, Florida*, contributed.

10/2016 **Fall DNP**, *"Beta-delayed neutron emission with neutron-gamma competition"*, *Vancouver, Canada*, contributed.

06/2016 **NIC2016**, *"The rare earth peak and the astrophysical location of the r-process"*, *Niigata, Japan*, contributed.

10/2015 **Fall DNP**, *"Global Monte Carlo calculations for r process nucleosynthesis"*, *Santa Fe, NM*, contributed.

03/2015 **JINA-CEE Frontiers**, *"Resolving the site(s) of the astrophysical r process"*, *East Lansing, MI*, speaker.

02/2015 **Group Seminar**, *"A quick primer on β-delayed neutron emission"*, *Notre Dame, IN*, seminar speaker.

10/2014 **DNP**, *"New calculations of β-delayed neutron emission probabilities"*, *Hawaii*, contributed talk.

08/2014 **INT2014**, *"Impact of nuclear physics inputs on the freeze-out phase of the r-process"*, *Seattle, WA*, seminar speaker.

07/2014 **NIC2014**, *"Impact of nuclear masses near closed shells on r-process abundances"*, *Hungary*, contributed talk.

10/2013 **Fall DNP 2013**, *"Nuclear Masses Near N=82 and Their Effects on r-Process Abundances"*, *Newport News, VA*, contributed talk.

09/2013 **Mazurian Lakes**, *"Nuclear Data Sensitivies for r-Process Nucleosynthesis"*, *Piaski, Poland*, speaker.

06/2013 **GRC 2013**, *"Nuclear Masses Near N=82 and Their Effects on r-Process Abundances"*, *New London, NH*, poster session.

04/2013 **Notre Dame Nuclear Seminar**, *"The Role of Nuclear Physics in the r-Process"*, *Notre Dame, IN*, seminar speaker.

11/2012 **NAVI-JINA Meeting**, *Late-time Dynamics And Impliciations For r-Process Nucleosynthesis"*, *NSCL East Lansing, MI*, speaker.

10/2012 **JINA Frontiers Meeting**, *"The Rare Earth Peak: An Overlooked r-Process Diagnostic"*, *MSU East Lansing, MI*, speaker.

08/2012 **NIC XII r-Process Workshop**, *"The Rare Earth Peak: An Overlooked r-Process Diagnostic"*, *Cairns, Australia*, speaker.

01/2012 **LANL Astrophysics Seminar**, *"The Formation Of The Rare Earth Elements: A Tool For Understanding The Site Of The r-Process"*, *LANL Los Alamos, NM*, seminar speaker.

10/2011 **Fall DNP 2011**, *"Formation Of The Rare Earth Peak: Gaining Insight Into Late-Time r-Process Dynamics"*, *MSU East Lansing, MI*, contributed talk.

10/2011 **NCSU Astrophysics Journal Club**, *"Formation Of The Rare Earth Peak: Gaining Insight Into Late-Time r-Process Dynamics"*, *NCSU Raleigh, NC*, speaker.

06/2011 **NNPSS 2011**, *"A New Production Mechanism For The Rare Earth Peak"*, *UNC Chapel Hill, NC*, poster session.

04/2011 **DOE Review Talk**, *"Rare Earth Isotopes And The r-Process"*, *NCSU Raleigh, NC*, speaker.

04/2011 **Reaction Network School**, *"Nova Nucleosynthesis"*, *Chiemsee, Germany*, speaker.

07/2010 **NIC-XI 2010**, *"Neutron Capture Rates And The Rare Earth Peak"*, *Heidelberg, Germany*, poster session.

07/2009 **Connecting Quarks & Cosmos**, *"The Influence Of Neutron Capture Rates In The Rare Earth Region Of The r-Process Abundance Pattern"*, *INT Seattle, WA*, contributed talk.

10/2008 **SESAPS 2008**, *"The Influence Of Neutron Capture Rates In The Rare Earth Region On The r-Process"*, *Raleigh, NC*, contributed talk.

09/2008 **NCSU Astrophysics Journal Club**, *"The Influence of Neutron Capture Rates In The Rare Earth Region On The r-Process"*, *NCSU Raleigh, NC*, speaker.

Refereed Papers

[1] T. M. Sprouse, **M. Mumpower**, R. Surman, "Following nuclei through nucleosynthesis: a novel tracing technique", PRC 104 015803 (2021).

[2] G. W. Misch, T. M. Sprouse, **M. Mumpower**, "Astromers in the radioactive decay of r-process nuclei", ApJL 913 L2 (2021).

[3] O. Korobkin, R. T. Wollaeger, C. L. Fryer, A. Hungerford, ***et al.***, "Axisymmetric radiative transfer models of kilonovae", ApJ 910 116 (2021).

[4] O. Hall, T. Davinson, A. Estrade, J. Liu, ***et al.***, "β-delayed neutron emission of r-process nuclei at the $N = 82$ shell closure", PLB 136266 (2021).

[5] M. Verriere, **M. Mumpower**, "Improvements to the macroscopic-microscopic approach of nuclear fission", PRC 103 034617 (2021).

[6] G. W. Misch, T. M. Sprouse, **M. Mumpower**, A. J. Couture, *et al.*, "Sensitivity of neutron-rich nuclear isomer behavior to uncertainties in direct transitions", submitted (2021).

[7] E. Holmbeck, A. Frebel, G. C. McLaughlin, R. Surman, *et al.*, "Reconstructing masses of merging neutron stars from stellar r-process abundance signatures", ApJ 909 21 (2021).

[8] B. Cote, M. Eichler, A. Yague, N. Vassh, *et al.*, "Constraining the rapid neutron-capture process with meteoritic 129-I and 247-Cm", Science 371 945-948 (2021).

[9] T. M. Sprouse, G. W. Misch, **M. Mumpower**, "Isochronic evolution and the radioactive decay of r-process nuclei", submitted (2021).

[10] N. Vassh, G. C. McLaughlin, **M. Mumpower**, R. Surman, "Markov Chain Monte Carlo predictions of neutron-rich lathanide properties as a probe of r-process dynamics", ApJ 907 98 (2021).

[11] A. Lovell, T. Kawano, S. Okumura, I. Stetcu, *et al.*, "Extension of the Hauser-Feshbach fission fragment decay model to multi-chance fission", PRC 103 014615 (2021).

[12] Y. Zhu, K. Lund, J. Barnes, T. M. Sprouse, *et al.*, "Modeling kilonova light curves: dependence on nuclear inputs", ApJ 906 94 (2021).

[13] G. W. Misch, S. K. Ghorui, P. Banerjee, Y. Sun, *et al.*, "Astromers: nuclear isomers in astrophysics", ApJS 252 2 (2021).

[14] X. Wang, N. Vassh, T. M. Sprouse, **M. Mumpower**, *et al.*, "MeV gamma rays from fission: a distinct signature of actinide production in neutron star mergers", ApJL 903 1 (2020).

[15] J. Barnes, Y. Zhu, K. Lund, T. M. Sprouse, *et al.*, "Kilonovae across the nuclear physics landscape: the impact of nuclear physics uncertainties on r-process-powered emission", submitted (2020).

[16] J. Miller, T. M. Sprouse, C. L. Fryer, B. R. Ryan, *et al.*, "Full transport general relativistic radiation magnetohydrodynamics for nucleosynthesis in collapsars", ApJ 902 1 (2020).

[17] S. Nikas, G. Perdikakis, M. Beard, R. Surman, *et al.*, "Propagation of Hauser-Feshbach uncertainty estimates to r-process nucleosynthesis: benchmark of statistical property models for neutron rich nuclei far from stability", submitted (2020).

[18] W. P. Even, O. Korobkin, C. J. Fontes, C. L. Fryer, *et al.*, "Composition effects on kilonova spectra and light curves: I", ApJ 899 1 (2020).

[19] N. Vassh, **M. Mumpower**, G. C. McLaughlin, T. M. Sprouse, *et al.*, "Co-production of light and heavy r-process elements via fission deposition", ApJ 896 1 (2020).

[20] T. M. Sprouse, R. Navarro Perez, R. Surman, **M. Mumpower**, *et al.*, "Propagation of statistical uncertainties of Skyrme mass models to simulations of r-process nucleosynthesis", PRC 101 055803 (2020).

[21] **M. Mumpower**, P. Jaffke, M. Verriere, J. Randrup, "Primary fission fragment mass yields across the chart of nuclides", PRC 101 054607 (2020).

[22] X. Wang, B. D. Fields, **M. Mumpower**, T. M. Sprouse, *et al.*, "Sandblasting the r-process: spallation of ejecta from neutron star mergers", ApJ 893 2 (2020).

[23] J. Wu, S. Nishimura, P. Moller, **M. Mumpower**, *et al.*, "β-decay half-lives of 55 neutron-rich isotopes beyond the $N = 82$ shell gap", PRC rapid communication (2020).

[24] M. Vilen, J. M. Kelly, A. Kankainen, M. Brodeur, **et al.**, "Exploring the mass surface near the rare-earth abundance peak via precision mass measurements at JYFLTRAP", PRC 101, 034312 (2020).

[25] T. L. Tang, B. P. Kay, C. R. Hoffmann, J. P. Schiffer, **et al.**, "First exploration of neutron shell structure below lead and beyond $N = 126$", PRL 124, 062502 (2020).

[26] O. Korobkin, A. Hungerford, C. L. Fryer, **M. Mumpower**, *et al.*, "Gamma-rays from kilonova: a potential probe of r-process nucleosynthesis", ApJ 889 2 (2020).

[27] S. Lyons, A. Spyrou, S. Liddick, F. Naqvi, **et al.**, "69,71 Co β-decay feeding intensities from total absorption spectroscopy", PRC 100 025806 (2019).

[28] A. Gade, B. Sherrill, D. Ahn, S. Ahn, **et al.**, "FRIB 400: the scientific case for the 400 MeV/u energy upgrade of FRIB", FRIB whitepaper (2019).

[29] E. Holmbeck, A. Frebel, G. C. McLaughlin, **M. Mumpower**, *et al.*, "Actinide-rich and actinide-poor r-process enhanced metal-poor stars do not require separate r-process progenitors", ApJ 881 1 (2019).

[30] R. T. Wollaeger, C. L. Fryer, C. J. Fontes, J. Lippuner, **et al.**, "Impact of pulsar and fallback sources on multifrequency kilonova models", ApJ 880 1 (2019).

[31] J. Miller, B. R. Ryan, J. C. Dolence, A. Burrows, **et al.**, "Full transport model of GW170817-like disk produces blue kilonova", PRD 100, 023008 (2019).

[32] C. Horowitz, A. Arcones, B. Cote, I. Dillmann, **et al.**, "r-process nucleosynthesis: connecting rare-isotope beam facilities with the cosmos", J. Phys. G 46 8 083001 (2019).

[33] N. Vassh, R. Vogt, R. Surman, J. Randrup, **et al.**, "Using excitation-energy dependent fission yields to identify key fissioning nuclei in r-process nucleosynthesis", J. Phys. G 46 065202 (2019).

[34] S. Jones, H. Moller, C. L. Fryer, C. J. Fontes, **et al.**, "^{60}Fe in core-collapse supernovae and prospects for X-ray and γ-ray detection in supernova remnants", MNRAS stz536 2019 (2019).

[35] C. L. Fryer, "Catching element formation in the act", Whitepaper (2019).

[36] P. Moller, **M. Mumpower**, T. Kawano, W. D. Myers, "Nuclear properties for astrophysical and radioactive-ion-beam applications (II)", ADNDT 125 (2019).

[37] E. Holmbeck, R. Surman, T. M. Sprouse, **M. Mumpower**, *et al.*, "Actinide production in neutron-rich ejecta of a neutron star merger", ApJ 870 1 (2018).

[38] **M. Mumpower**, T. Kawano, T. M. Sprouse, N. Vassh, *et al.*, "β-delayed fission in r-process nucleosynthesis", ApJ 869 1 (2018).

[39] A. Aprahamian, R. Surman, A. Frebel, G. C. McLaughlin, **et al.**, "FRIB and the GW170817 kilonova", Whitepaper (2018).

[40] Y. Zhu, R. T. Wollaeger, N. Vassh, R. Surman, **et al.**, "Californium-254 and kilonova light curves", ApJL 863 2 (2018).

[41] M. Vilen, J. M. Kelly, A. Kankainen, M. Brodeur, **et al.**, "Improving r-process calculations for the rare-earth abundance peak via mass measurements at JYFLTRAP", PRL 120, 262701 (2018).

[42] R. Orford, N. Vassh, J. Clark, G. C. McLaughlin, **et al.**, "Precision mass measurements of neutron-rich neodymium and samarium isotopes and their role in understanding rare-earth peak formation", PRL 120, 262702 (2018).

[43] B. Cote, C. L. Fryer, K. Belczynski, O. Korobkin, **et al.**, "The origin of r-process elements in the Milky Way", ApJ 855 2 (2018).

[44] **M. Mumpower**, T. Kawano, J. L. Ullmann, M. Krticka, *et al.*, "Estimation of M1 scissors mode strength for deformed nuclei in the medium to heavy mass region by statistical Hauser-Feshbach model calculations", PRC 96 024612 (2017).

[45] A. Spyrou, A. C. Larsen, S. Liddick, F. Naqvi, **et al.**, "Neutron-capture rates for explosive nucleosynthesis: the case of ^{68}Ni$(n,\gamma)^{69}$Ni", J. Phys. G 44 4 044002 (2017).

[46] **M. Mumpower**, G. C. McLaughlin, R. Surman, A. W. Steiner, "Reverse engineering nuclear properties from rare earth abundances in the r process", J. Phys. G 44 3 034003 (2017).

[47] **M. Mumpower**, G. C. McLaughlin, R. Surman, A. W. Steiner, "The link between rare earth peak formation and the astrophysical site of the r process", ApJ 833, 282 (2016).

[48] **M. Mumpower**, T. Kawano, P. Moller, "Neutron-gamma competition for β-delayed neutron emission", PRC 94 064317 (2016).

[49] T. Shafer, J. Engel, C. Frohlich, G. C. McLaughlin, **et al.**, "β decay of deformed r-process nuclei near $A = 80$ and $A = 160$, including odd-A and odd-odd nuclei, with the Skyrme finite-amplitude method", PRC 94 055802 (2016).

[50] A. Spyrou, S. Liddick, F. Naqvi, B. P. Crider, **et al.**, "Strong neutron-γ competition above the neutron threshold in the decay of ^{70}Co", PRL 117, 142701 (2016).

[51] S. Liddick, A. Spyrou, B. P. Crider, F. Naqvi, **et al.**, "Experimental neutron capture rate constraint far from stability", PRL 116, 242502 (2016).

[52] **M. Mumpower**, R. Surman, G. C. McLaughlin, A. Aprahamian, "The impact of individual nuclear properties on r-process nucleosynthesis", PPNP 86 86-126 (2016).

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References

[1] **Professor** Ani Aprahamian
Dept. Of Physics
University of Notre Dame
Notre Dame, IN 46556
Phone (574) 631-8120
E-mail aapraham@nd.edu

[2] **Professor** Gail McLaughlin (thesis advisor)
Dept. Of Physics
NC State University
Raleigh, NC 27695
Phone (919) 513-0516
E-mail gail_mclaughlin@ncsu.edu

[3] **Professor** Rebecca Surman
Dept. Of Physics
University of Notre Dame
Notre Dame, IN 46556
Phone (574) 631-6590
E-mail rsurman@nd.edu

[4] **Dr.** Toshihiko Kawano
Theory Division (T-2)
Los Alamos National Lab
Los Alamos, NM 87544
Phone (505) 664-0513
E-mail kawano@lanl.gov

[5] **Dr.** Aaron Couture
LANSCE Weapons Physics (P-27)
Los Alamos National Lab
Los Alamos, NM 87544
Phone (505) 667-1730
E-mail acouture@lanl.gov

[6] **Dr.** Micha Kilburn
JINA outreach coordinator
University of Notre Dame
Notre Dame, IN 46556
Phone (574) 631-5326
E-mail mkilburn@nd.edu