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Melina L. Avila

Education

2013 **Ph.D. in Physics**, *Florida State University*, Tallahassee FL.
Advisor: Dr. Grigory Rogachev
Dissertation project: Clustering in ^{18}O and ANC measurements using (^{6}Li,d) reactions.

2009 **M.S. in Physics**, *Florida State University*, Tallahassee FL.
Fulfillment of academic requirements.

2007 **Bachelor in Physics**, *Universidad Autonoma de Nuevo Leon*, Monterrey NL, Mexico.
Undergraduate Project: Characterization of leukemia by electrical impedance spectroscopy.

Employment

2021-Present **Physicist-Experimentalist**, *Argonne National Laboratory*.

2016-2021 **Assistant Physicist-Experimentalist**, *Argonne National Laboratory*.

2014–2016 **Postdoctoral Appointee**, *Argonne National Laboratory*.

2008–2013 **Research Assistant**, *John D. Fox Superconducting Linear Accelerator Laboratory at Florida State University*, Dr. Grigory Rogachev.

Awards & Honors

May 2021 **Early Career Research Program Award**, *"Measuring key nuclear reactions for the weak r-process"*, Department Of Energy, Office of Nuclear Physics.

April 2013 **John D. Fox award in Nuclear Physics**, Department of physics, Florida State University.
Tallahassee, Florida

Jun 2011 **Poster presentation award winner**, The Nuclear Chemistry Gordon Research Conference.
New London, New Hampshire

Funded proposal history

FY17–FY19 **LDRD prime proposal–Universe as our Lab (ULab) focus area**, *"Nucleosynthesis in the First Stars"*, LDRD program, Argonne National Laboratory.

Professional activities

2019-Present **General member of the FRIB User Organization executive committee**, *FRIB*.

2020-Present **Member-at-Large of the Executive committee of the APS Topical Group on Few-Body Systems and Multiparticle Dynamic**, American Physical Society, Division of Nuclear Physics.

2020-Present **Member of the Diversity, Equity and Inclusion Committee**, *Physics Division*, Argonne National Laboratory.

Professional Memberships

Member of the American Physical Society since 2011.

Organization of workshops

July 2019 **Co-Organizer of the "Workshop on Nuclear Astrophysics Opportunities at ATLAS"**, *Argonne IL*.

2016-Present **Co-Organizer of the working group on Nuclear Astrophysics at the Low Energy Community Meeting**.

Panel participation

April 2022 **Career panel in Chemistry, Physics and Beyond**, *Science Careers in search of women*, ANL (virtual).

April 2021 **Career panel in Chemistry, Physics and Beyond**, *Science Careers in search of women*, ANL (virtual).

June 2019 **Invited to the career panel discussion**, *Gordon Research Seminar*, New London, NH.

Invited Oral presentations

July 2021 **Direct measurements of (α,n) cross sections and their impact in Nuclear Astrophysics**, *Virtual Workshop on (α,n) ractions*, virtual presentation.

Nov 2020 **Stellar Processes and the Role of Nuclear Physics**, *Physics Colloquium, Department of Physics and Astronomy, University of Tennessee at Knoxville*, virtual presentation.

Nov 2020 **Measuring (α,n) reaction rates relevant for nuclear astrophysics**, *Fall meeting of the APS Division of Nuclear Physics.*
Virtual presentation

Aug 2020 **Nuclear Astrophysics at ATLAS**, *Low Energy community meeting.*
Virtual presentation

Sept 2019 **Nuclear Astrophysics Measurements Using the MUSIC Active Target System**, *Nuclear Physics Seminar at the University of Notre Dame.*
Notre Dame, IN

May 2018 **Study of α-particle induced reactions using the MUSIC detector**, *SOTANCP4.*
Galveston, Texas

Mar 2018 **Type I X-ray bursts: explosions in binary systems and the role of nuclear physics**, *Physics Colloquium, Argonne National Laboratory.*
Argonne, Illinois

Dec 2017 **Stellar explosions: The importance of nuclear reaction rates**, *Physics Colloquium, Northern Illinois University.*
DeKalb, Illinois

Aug 2017 **Experimental Nuclear Astrophysics**, *Low Energy Community meeting (FRIB Day 1 workshop).*
Argonne, Illinois

May 2017 **Study α-induced reactions of astrophysical relevance**, *ARIS 2017.*
Keystone, Colorado

Feb 2017 **Measuring α-induced reactions using a Multi-Sampling Ionization Chamber**, *JINA-CEE seminar.*
East Lansing, Michigan

Apr 2016 **Direct measurement of astrophysically important α-induced reactions**, *APS April meeting 2016.*
South Lake City, Utah

Jan 2016 **Understanding Stellar Processes Through Nuclear Reactions**, Physics Colloquium at the department of Physics, Ohio University.
Athens, Ohio

Nov 2015 **Understanding Stellar Processes Through Nuclear Reactions**, Heavy Ion Discussion,.
Argonne, Illinois

Aug 2015 **ANCs at sub-Coulomb energies to constrain key α-capture reaction rates**, Nuclear physics seminar at the University of Notre Dame.
South Bend, Indiana

Aug 2015 **New possibilities for key astrophysical α-induced reactions studies**, Low energy community meeting (AIRIS workshop).
East Lansing, Michigan

May 2015 **Nuclear reactions: Current status and perspectives** , The Nuclear Chemistry Gordon Research Seminar.
New London, New Hampshire

Other contributed Presentations

Nov 2020 **Measuring (α,n) reaction rates relevant for nuclear astrophysics**, *Heavy Ion Discussion, Physics Division, Argonne National Laboratory.*
Virtual presentation

Aug 2020 **ATLAS Physics Highlights**, *ATLAS one-day site visit*, ANL.
Virtual presentation

July 2020 **Probing Stellar reactions in the laboratory**, *Student Lunch seminar (virtual).*
Argonne, IL

May 2020 **Day 1 experiments with MUSIC at FRIB**, *FRIB first experiments: Proposal preparation workshop.*
Virtual presentation

May 2019 **Direct Measurements of (α,p) and (α,n) Reaction Rates Relevant for Nuclear Astrophysics**, *2019 Frontiers in Nuclear Astrophysics Conference.*
East Lansing, Michigan

March 2019 **Nuclear Physics for the Understanding of X-ray Bursts**, *Student Lunch seminar.*
Argonne, IL

April 2019 **ATLAS Accelerator**, *Science Careers in search of women.*
Argonne, IL

July 2019 **Nuclear Astrophysics at ATLAS**, *ATLAS Science and Technology Review.*
Argonne, IL

July 2018 **Nuclear Astrophysics at ATLAS**, *Student Lunch seminar* .
Argonne, IL

Mar 2016 **Measuring key α-induced reaction rates with the MUSIC detector**, JINA-CEE Frontiers in Nuclear Astrophysics 2016.
South Bend, Indiana

Jun 2015 **Study of ^{20,22,24}Ne+^{20,22}Ne and ^{10,12,13,14,15}C+^{12}C fusion reactions with MUSIC**, Nucleus Nucleus 2015.
Catania, Italy

Mar 2013 **ANC measurements on (^{6}Li,d) reactions**, FSU Department of Nuclear Physics Seminar.
Tallahasse, Florida

Nov 2012 **ANC measurements on (^{6}Li,d) reactions**, 79th Annual Meeting of the Southeastern Section of the APS.
Tallahassee, Florida

Oct 2012 **ANC measurements on (^{6}Li,d) reactions**, Fall meeting of the APS Division of Nuclear Physics.
Newport Beach, California

Oct 2011 **Clustering phenomena in ^{18}O**, Fall meeting of the APS Division of Nuclear Physics.
East Lansing, Michigan

Sep 2011 **Clustering phenomena in ^{18}O**, 6th European Summer School on Experimental Nuclear Astrophysics.
Catania, Italy

Jun 2011 **Clustering phenomena in ^{18}O**, The Nuclear Chemistry Gordon Research Conference.
New London, New Hampshire

Apr 2011 **Clustering phenomena in ^{18}O**, FSU Department of Nuclear Physics Seminar.
Tallahasse, Florida

Oct 2009 **α-Clustering in ^{18}O**, FSU Department of Nuclear Physics Seminar.
Tallahasse, Florida

Poster presentations

May 2015 **Measurements of (α, p) and (α, n) reactions using the Active Target System MUSIC**, The Nuclear Chemistry Gordon Research Conference.
New London, New Hampshire

Jun 2011 **Clustering phenomena in ^{18}O**, The Nuclear Chemistry Gordon Research Conference.
New London, New Hampshire

Aug 2009 **α-Clustering in ^{18}O**, VIII Summer School on Exotic Beam Physics.
Berkeley, California

Publications

[1] W. J. Ong, **M. L. Avila**, P. Mohr, K. E. Rehm, D. Santiago-Gonzalez, J. Chen, C. R. Hoffman, Z. Meisel, F. Montes, and J. Pereira
"Measurement of the ^{100}Mo(α, xn) cross section at weak r-process energies", accepted in Phys. Rev. C

[2] H. Jayatissa, **M. L. Avila**, K. E. Rehm, R. Talwar, P. Mohr, K. Auranen, J. Chen, D. A. Gorelov, C. R. Hoffman, C. L. Jiang, B. P. Kay, S. A. Kuvin, and D. Santiago-Gonzalez
"First direct measurement of the ^{13}N$(\alpha, p)^{16}$O reaction relevant for core-collapse supernovae nucleosynthesis", Phys. Rev. C 105, L042802 (2022)

[3] C.R.Hoffman, T.L.Tang, **M.Avila**, Y.Ayyadb, K.W.Brown, J.Chen, K.A.Chipps, H.Jayatissa, B.P.Kay, C.Müller-Gatermann, H.J.Ong, J.Song, G.L.Wilsong
"In-flight production of an isomeric beam of 16N", Nucl. Instrum. Meth. Phys. Res. Sect. A 1032 (2022) 166612

[4] C. Hunt, G. V. Rogachev, S. Almaraz-Calderon, A. Aprahamian, **M. Avila**, L. T. Baby, B. Bucher, V. Z. Goldberg, E. D. Johnson, K. W. Kemper, A. N. Kuchera, W. P. Tan, and I. Wiedenhöver
"Observation of T=3/2 isobaric analog states in ^{9}Be using p+^{8}Li resonance scattering", Phys. Rev. C **102**, 014615 (2020)

[5] J.Chen, K.Auranen, **M.L.Avila**, B.B.Back, M.A.Caprio, C.R.Hoffman, D.Gorelov, B.P.Kay, S.A.Kuvin, Q.Liu, J.L.Lou, A.O.Macchiavelli, D.G.McNeel, T.L.Tang, D.Santiago-Gonzalez, R.Talwar, J.Wu, G.Wilson, R.B.Wiringa, Y.L.Ye, C.X.Yuan, H.L.Zang
"Experimental study of the low-lying negative-parity states in ^{11}Be using the ^{12}B$(d,^{3}$He$)^{11}$Be reaction", Phys. Rev. C 100, 064314 (2019)

6] P. Mohr, R. Talwar, **M. L. Avila** and K. E. Rehm
"Cross sections of α-induced reactions slightly below doubly-magic ^{40}Ca from the statistical model", Phys. Rev. C **98**, 045808 (2018).

[7] J. Chen, C. R. Hoffman, T. Ahn, J. Allen, K. Auranen, **M. L. Avila**, B. B. Back, D. Bardayan, D. Blankstein, P. Copp, D. Gorelov, B. P. Kay, S. A. Kuvin, J. P. Lai, D. McNeel, P. O'Malley, A. Rogers, D. Santiago-Gonzalez, J. P. Schiffer, J. Sethi, R. Talwar, and J. Winkelbauer
"Study of the effective nucleon-nucleon interaction using the ^{21}F$(d, p)^{22}$F reaction". Phys. Rev. C. **98**, 014325 (2018).

[8] M. Tessler, M. Paul, S. Halfon, B. S. Meyer, R. Pardo, R. Putschert, K. E. Rehm, R. Scott, M. Weigand, L. Weissman, S. Almaraz-Calderon, **M.L. Avila**, D. Baggenstos, P. Collon, N. Hazenshprung, Y. Kashiv, D. Kijel, A. Kreisel, R. Reifarth, D. Santiago-Gonzalez, A. Shor, I. Silverman, R. Talwar, D. Veltum and R. Vondrasek
"Stellar ^{36,38}Ar$(n,\gamma)^{37,39}$Ar reactions and their effect on light neutron-rich nuclide synthesis", Phys. Rev. Lett. **121**, 112701 (2018).

[9] B. W. Asher, S. Almaraz-Calderon, O. Nusair, K. E. Rehm, **M. L. Avila**, A. A. Chen, C. A. Dickerson, C. L. Jiang, B. P. Kay, R. C. Pardo, D. Santiago-Gonzalez and R. Talwar
"Development of an Isomeric beam of ^{26}Al for nuclear reactions studies". Nucl. Instrum. Meth. Phys. Res. Sect. A **899**, 6-9 (2018).

[10] R. Talwar, M. J. Bojazi, P. Mohr, K. Auranen, **M.L. Avila**, A. D. Ayangeakaa, J. Harker, C. R. Hoffman, C. L. Jiang, S. A. Kuvin, B. S. Meyer, K. E. Rehm, D. Santiago-Gonzalez, J. Sethi, C. Ugalde and J. R. Winkelbauer
"Experimental study of the ^{38}Ar+α induced cross sections relevant to the ^{41}Ca abundance in the solar system", Phys. Rev. C **97**, 055801 (2018).

[11] D. Santiago-Gonzalez, K. Auranen, **M. L. Avila**, A. D. Ayangeakaa, B. B. Back, S. Bottoni, M. P. Carpenter, J. Chen, C. M. Deibel, A. A. Hood, C. R. Hoffman, R. V. F. Janssens, C. L. Jiang, B. P. Kay, S. A. Kuvin, A. Lauer, J. P. Schiffer, J. Sethi, R. Talwar, I. Wiedenhöver, J. Winkelbauer and S. Zhu
"Probing the Single-Particle Character of Rotational States in ^{19}F Using a Short-Lived Isomeric Beam". Phys. Rev. Lett. **120**, 122503 (2018).

[12] J. Lai, L. Afanasieva, J. C. Blackmon, C. M. Deibel, H. E. Gardiner, A. Lauer, L. E. Linhardt, K. T. Macon, C. C. Rasco, C. Williams, D. Santiago-Gonzalez, S. A. Kuvin, S. Almaraz-Calderon, L. T. Baby, J. Belarge, I. Wiedenhöver, E. Need, **M. L. Avila**, B. B. Back, B. DiGiovine, C. R. Hoffman
"Position-sensitive, fast ionization chambers". Nucl. Instrum. Meth. Phys. Res. Sect. A **890**, 119-125 (2018).

[13] **M.L. Avila**, L.T. Baby, J. Belarge, N. Keeley, K.W. Kemper, E. Koshchiy, A.N. Kuchera, G.V. Rogachev, K. Rusek, and D. Santiago-Gonzalez
"Sub-Coulomb ^{3}He transfer and its use to extract three-particle asymptotic normalization coefficients", Phys. Rev. C **97**, 014313 (2018).

[14] C. L. Jiang, D. Santiago-Gonzalez, S. Almaraz-Calderon, K. E. Rehm, B. B. Back, K. Auranen, **M. L. Avila**, A. D. Ayangeakaa, S. Bottoni, M. P. Carpenter, C. Dickerson, B. DiGiovine, J. P. Greene, C. R. Hoffman, R. V. F. Janssens, B. P. Kay, S. A. Kuvin, T. Lauritsen, R. C. Pardo, J. Sethi, D. Seweryniak, R. Talwar, C. Ugalde, S. Zhu, D. Bourgin, S. Courtin, F. Haas, M. Heine, G. Fruet, D. Montanari, D. G. Jenkins, L. Morris, A. Lefebvre-Schuhl, M. Alcorta, X. Fang, X. D. Tang, B. Bucher, C. M. Deibel, and S. T. Marley
"Reaction rate for carbon burning in massive stars", Phys. Rev. C **97**, 012801(R) (2018).

[15] S.A. Kuvin, A.H. Wuosmaa, C.J. Lister, **M.L. Avila**, C.R. Hoffman, B.P. Kay, D.G. McNeel, C. Morse, E.A. McCutchan, D. Santiago-Gonzalez, and J.R. Winkelbauer
"α decay of the T=1,2^2 state in ^{10}B and isospin symmetry breaking in the A=10 triplet, Phys. Rev. C **96**, 041301(R) (2017).

[16] S. Almaraz-Calderon, K.E. Rehm, N. Gerken, **M.L. Avila**, B.P. Kay, R. Talwar, A. D. Ayangeakaa, S. Bottoni, A.A. Chen, C.M. Deibel, C. Dickerson, K. Hanselman, C.R. Hoffman, C.L. Jiang, S.A. Kuvin, O. Nusair, R.C. Pardo, D. Santiago-Gonzalez, J. Sethi and C. Ugalde
"Study of the ^{26}Al$^m(d,p)^{27}$Al Reaction and the Influence of the ^{26}Al 0^+ Isomer on the Destruction of ^{26}Al in the Galaxy", Phys. Rev. Lett, **119**, 072701 (2017).

[17] **M.L. Avila**, K. E. Rehm, S. Almaraz-Calderon, A. D. Ayangeakaa, C. Dickerson C.R. Hoffman, C.L. Jiang, B.P. Kay, J. Lai, O. Nusair, R.C. Pardo, D. Santiago-Gonzalez, R. Talwar and C. Ugalde
"Study of the (α,p) and (α,n) reactions with a Multi-Sampling Ionization Chamber", Nucl. Instrum. Meth. Phys. Res. Sect. A **859**, 63 (2017).

[18] **M.L. Avila**, K. E. Rehm, S. Almaraz-Calderon, A. D. Ayangeakaa, C. Dickerson C.R. Hoffman, C.L. Jiang, B.P. Kay, J. Lai, O. Nusair, R.C. Pardo, D. Santiago-Gonzalez, R. Talwar and C. Ugalde
"Experimental study of the astrophysically important ^{23}Na$(\alpha,p)^{26}$Mg and ^{23}Na$(\alpha,n)^{26}$Al reactions", Phys. Rev. C 94, 065804 (2016).

[19] M. Munch, M. Alcorta, H. O. U. Fynbo, M. Albers, S. Almaraz-Calderon, **M. L. Avila**, A. D. Ayangeakaa, B. B. Back, P. F. Bertonee, P. F. F. Carnelli, M. P. Carpenter, C. J. Chiara, J. A. Clark, B. DiGiovine, J. P. Greene, J. L. Harker, C. R. Hoffman, N. J. Hubbard, C. L. Jiang, O. S. Kirsebom, T. Lauritsen, K. L. Laursen, S. T. Marley, C. Nair, O. Nusair, D. Santiago-Gonzalez, J. Sethi, D. Seweryniak, R. Talwar, C. Ugalde and S. Zhu
"Independent measurement of the Hoyle state β feeding from ^{12}B using Gammasphere", Phys. Rev. C. **93**, 065803 (2016).

[20] **M.L. Avila**, G.V. Rogachev, E. Koshchiy, L.T. Baby, J. Belarge, K.W. Kemper, A.N. Kuchera, D. Santiago-Gonzalez
"New measurement of the α asymptotic normalization coefficient of the $1/2^+$ state in O^{17} at 6.356 MeV that dominates the ^{13}C$(\alpha,n)^{16}$O reaction rate at temperatures relevant for the s process", Phys. Rev. C. **91**, 048801(2015).

21] C.L. Jiang, A. M. Stefanini, H. Esbensen, K. E. Rhem, S. Almaraz-Calderon, **M. L. Avila**, B. B. Back, D. Bourgim, L. Corradi, S. Courtin, E. Fioretto, F. Galtarossa, A. Goasduff, F. Haas, M.M. Mazzocco, D. Montanari, G. Montagnoli, T. Mijatovic, R. Sagaidak, D. Santiago-Gonzalez, F. Scarlassara, E. E. Strano, S. Szilner
"Fusion reactions of ^{58,64}Ni+^{124}Sn", Phys. Rev. C. **91**, 044602 (2015).

[22] **M.L. Avila**, G.V. Rogachev, E. Koshchiy, L.T. Baby, J. Belarge, K.W. Kemper, A.N. Kuchera, A.M. Mukhamedzhanov, D. Santiago-Gonzalez, E. Uberseder
"Constraining the 6.05 MeV 0^+ and 6.13 MeV 3^- Cascade Transitions in the ^{12}C$(\alpha,\gamma)^{16}$O Reaction Using the Asymptotic Normalization Coefficients", Phys. Rev. Lett. **114**, 071101 (2015).

[23] **M.L. Avila**, G.V. Rogachev, E. Koshchiy, L.T. Baby, J. Belarge, K.W. Kemper, A.N. Kuchera, D. Santiago-Gonzalez
"α-cluster asymptotic normalization coefficients for nuclear astrophysics", Phys. Rev. C **90**, 042801(R) (2014)

[24] **M.L. Avila**, G.V. Rogachev, V.Z. Goldberg, E.D. Johnson, K.W. Kemper, Yu M. Tchuvil'sky, A. S. Volya
"α-cluster structure of ^{18}O", Phys. Rev. C **90**, 024327 (2014)

[25] M.La Cognata, C. Spitaleri, O. Trippella, G.G. Kiss, G.V. Rogachev, A.M. Mukhamedzhanov, **M. Avila**, G.L. Guardo, E. Koshchiy, A. Kuchera, L. Lamia, S.M.R. Puglia, S. Romano, D. Santiago, R. Sparta
"On the measurement of the $^{13}C(\alpha, n)^{16}O$ S-factor at negative energies and its influence on the s-Process", Astrophys. J. **777**, 143 (2013)

[26] M.La Cognata, C. Spitaleri, O. Trippella, G.G. Kiss, G.V. Rogachev, A.M. Mukhamedzhanov, **M. Avila**, G.L. Guardo, E. Koshchiy, A. Kuchera, L. Lamia, S.M.R. Puglia, S. Romano, D. Santiago, R. Sparta
"Measurement of the -3 keV Resonance in the Reaction $^{13}C(\alpha, n)^{16}O$ of Importance in the s-Process", Phys. Rev. Lett. **109**, 232701 (2012)

[27] D. Santiago-Gonzalez, I. Wiedenhöver, V. Abramkina, **M.L. Avila**, T. Baugher, D. Bazin, B.A. Brown, P.D. Cottle, A. Gade, T. Glasmacher, K.W. Kemper, S. McDaniel, A. Rojas, A., A. Ratkiewicz, R. Meharchand, E.C. Simpson, J.A. Tostevin, A. Volya, D. Weisshaar
"Triple configuration coexistence in ^{44}S", Phys. Rev. C **83**, 061305(R) (2011)

[28] V.Z. Goldberg, B.T. Roeder, G.V. Rogachev, G.G. Chubarian, E.D. Johnson, C. FU, A.A. Alharabi, **M.L. Avila**, A. Banu, M McCleskey, J.P. Mitchell, E. Simmons, G. Tabacaru, G. L. Trache, R.E. Tribble
"First Observation of ^{14}F", Phys. Lett. B **46** (2010) 307.

Conference proceedings as first author

[1] **M.L. Avila**, S. Almaraz-Calderon, A. D. Ayangeakaa, C. Dickerson, C.R. Hoffman, C.L. Jiang, B.P. Kay, J. Lai, O. Nusair, R.C. Pardo, K. E. Rahem, D. Santiago-Gonzalez, R. Talwar and C. Ugalde
"Study of α-particle induced reactions using the MUSIC detector". AIP Conference Proceedings **2038**, 020018 (2018) SOTANCP4

[2] **M.L. Avila**, K.E. Rhem, S. Almaraz-Calderon, P.F.F. Carnelli, B. DiGiovine, H. Esbensen, C.R. Hoffman, C.L. Jiang, B.P. Kay, J. Lai, O. Nusair, R.C. Pardo, D. Santiago-Gonzalez, R. Talwar and C. Ugalde
"Study of the $^{20,22}Ne+20, 22Ne$ and $^{10,12,13,14,15}C+^{12}C$ Fusion Reactions with MUSIC". The European Physical Journal Conferences **117**, 08009 (2016) NN2015