

CURRICULUM VITAE**Mark Anthony Caprio**

Department of Physics
 University of Notre Dame
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RESEARCH INTERESTS

Ab initio nuclear theory. Collective nuclear structure. Group theoretical and computational methods for strongly-interacting quantum many-body systems.

APPOINTMENTS

Associate Professor , <i>Department of Physics, University of Notre Dame</i>	2013–
Associate Chair & Director of Graduate Studies , 2016–.	
Assistant Professor , <i>Department of Physics, University of Notre Dame</i>	2007–2013
Postdoctoral Associate , <i>Physics Department, Yale University</i> (F. Iachello, advisor)	2003–2007

EDUCATION

Ph.D. , Physics. <i>Yale University</i> . With distinction. (R. F. Casten, advisor)	2003
M.Phil. , 1999. M.S. , 1998.	
B.S. , Physics, Mathematics. <i>Oglethorpe University</i> . With honors. <i>Summa cum laude</i> .	1994

AWARDS

Shilts/Leonard Teaching Award , <i>College of Science, University of Notre Dame</i>	2017
Faculty Fellow, Kaneb Center for Teaching and Learning , <i>University of Notre Dame</i>	2014
Joyce Award for Excellence in Undergraduate Teaching , <i>University of Notre Dame</i>	2014
Cottrell Scholar Award , <i>Research Corporation for Science Advancement</i>	2010

PROFESSIONAL SERVICE

Associate Editor, *European Physical Journal A: Hadrons and Nuclei* (2017–).

Summer school lecturer:

Balkan School on Nuclear Physics, Akdeniz University, Adrasan, Turkey, September 2010.

Training in Advanced Low Energy Nuclear Theory (TALENT) course “Theory for Exploring Nuclear Structure Experiments”, GANIL, Caen, France, August 2014.

National Nuclear Physics Summer School (NNPSS), Yale University, New Haven, CT, June 2018.

PROFESSIONAL SERVICE (CONTINUED)

Conference organizing and advisory committees:

Nuclear Structure, International Advisory Committee, Berkeley, California, August 2010.

—, Knoxville, Tennessee, July 2016.

Horizons on Innovative Theories, Experiments, and Supercomputing in Nuclear Physics, Organizing Committee, New Orleans, Louisiana, June 2012.

International Conference on Nuclear Theory in the Supercomputing Era, Scientific Advisory Committee, Ames, Iowa, May 2013.

—, Khabarovsk, Russia, September 2014.

—, Khabarovsk, Russia, September 2016.

—, Daejeon, Republic of Korea, October/November 2018.

—, Roorkee, India, October 2020 (cancelled).

Symmetries and Order: Algebraic Methods in Many Body Systems, Organizing Committee, New Haven, Connecticut, October 2018.

The 32nd Annual Midwest Theory Get-Together, Chair, Organizing Committee, Argonne, Illinois, October 2019.

Conference proceedings co-editor: *Proceedings of the Conference on Horizons on Innovative Theories, Experiments, and Supercomputing in Nuclear Physics 2012* K. D. Launey, M. A. Caprio, J. Escher, J. Hirsch, and C. W. Johnson, eds., Journal of Physics: Conference Series, Vol. 203 (IOP Publishing, London, 2012).

Referee articles for journals and proceedings (115 papers reviewed to date):

Acta Physica Polonica B, American Institute of Physics Conference Proceedings, Annals of Physics, Canadian Journal of Physics, Chinese Physics C, Computer Physics Communications, European Physical Journal A, Europhysics Letters, International Journal of Modern Physics E, Journal of Computational Physics, Journal of Mathematical Physics, Journal of Physics A, Journal of Physics G, Journal of Physics Conference Series, Journal of Statistical Mechanics: Theory and Experiment (JSTAT), Modern Physics Letters A, Molecular Physics, Nuclear Instruments and Methods in Physics Research A, Nuclear Physics A, Physica Scripta, Physical Review A, Physical Review C, Physical Review Letters, Physics Letters B, Physics Today, Reports on Progress in Physics.

Review grant proposals for the US National Science Foundation and US Department of Energy.

Visiting Fellow, *European Centre for Theoretical Studies in Nuclear Physics and Related Areas* (ECT*), Trento, Italy (Summers 2003–2007).

Created widely-used scientific figure preparation system for Mathematica (SciDraw) and Bib_TE_X style for Institute of Physics journal authors.

Professional society memberships: American Physical Society (APS), American Astronomical Society (AAS), Mathematical Association of America (MAA).

STUDENTS AND POSTDOCTORAL ASSOCIATES SUPERVISED

Undergraduate students

Undergraduate theses supervised:

Mitch A. McNanna (2013–2015).
 Alexa I. Rakoski (2013–2015).
 Taylor M. Hernandez (2017–2019).

Research Experiences for Undergraduates (REU) summer students supervised:

Anna E. McCoy (Grinnell College, 2009).
 Ke Cai (Bard College, 2010).
 James F. St. Germaine-Fuller (Grinnell College, 2014).
 Abraham R. Flores (Michigan State University, 2016).
 Julie Butler (Erskine College, 2017).
 Robert Power (University College Cork, 2018).
 Isabella Zane (Texas A&M University, 2020).
 Colin Coane (University of Southern California, 2021).

Doctoral students

Fengqiao Luo (2014). *Can nuclear structure be revealed in a reduced model space?*
 Weichuan Li (2016, coadvised with S. Frauendorf). *Algebraic collective model and its application to core quasiparticle coupling.*
 Chrysovalantis Constantinou (2017). *Natural orbitals for the no-core configuration interaction approach.*
 Anna E. McCoy (2018). *Ab initio multi-irrep symplectic no-core configuration interaction calculations.* DOE Office of Science Graduate Student Research (SCGSR) Award (2015).
 Notre Dame Center for Research Computing Award for Computational Sciences and Visualization (2018).
 Patrick J. Fasano (2016–, in progress). DOE Office of Science Graduate Student Research (SCGSR) Award (2020).
 Jakub Herko (2018–, in progress).
 Zhou Zhou (2018–, in progress).

Postdoctoral associates

Veerle Hellemans (2009–2010).

DEPARTMENT/UNIVERSITY SERVICE

Associate Chair & Director of Graduate Studies, Department of Physics (2016–).

Member, Core Curriculum Subcommittee on Writing (2018–2020).

Member, Faculty Senate (2013–2016).

Pedagogy: Faculty Fellow, Kaneb Center for Teaching and Learning (2014–2015). Lead break-out sessions on active learning for Notre Dame new faculty orientation (2017, 2018, 2019, 2020). Initiated and coordinated departmental Pedagogy Coffee series (2014–2016).

Class advisor, undergraduate physics majors of the class of '15 (2011–2015).

Coordinator, Physics Teaching Practicum experience for physics graduate students (2014–2019).

Service on departmental committees: Graduate Recruitment (2007–2016; chair, 2013–2016); Computer (2007–2012); Colloquium (2008–2013); Undergraduate Curriculum (2012–2016); *ad hoc* nuclear graduate curriculum (2015); Instructional & Course Offering (2015–); Graduate Curriculum (chair, 2016–); faculty search committees (2019–2020, 2020–2021); graduate student research committees and junior faculty mentoring committees.

EXTERNAL FUNDING**Nuclear properties at extreme density, temperature, spin, and isospin**

US Department of Energy, Office of Science, Grant Number DE-FG02-95ER40934, 2007–2010. Renewed 2010–2013. Renewed 2013–2016. Renewed 2016–2018. Renewed 2018–2021. *Group grant with G. J. Mathews, S. Frauendorf, and R. A. Surman.*

Symmetries in the nuclear many-body problem: Conquering the computational scale explosion

Cottrell Scholar Award, Research Corporation for Science Advancement, 2011–2014.

The Cottrell Scholar Awards have been presented annually since 1994 by the Research Corporation for Science Advancement (RCSA), America's first foundation dedicated wholly to science. The awards honor outstanding early career scientists in the physical sciences for leadership in integrating science teaching and research at leading U.S. research universities. The Cottrell Scholar program is highly competitive, with an average award rate of 10%.

EXTERNAL COMPUTING AWARDS***Ab initio* nuclear structure**

Computing award, National Energy Research Scientific Computing Center (US Department of Energy), 50 000 CPU hours, 2015. 2 100 000 CPU hours, 2016. 5 900 000 CPU hours, 2017. 7 500 000 CPU hours, 2018. 9 250 000 CPU hours, 2019. 10 000 000 CPU hours, 2020. 8 000 000 CPU hours, 2021.

PROGRAMMING LANGUAGES

C/C++, Python, FORTRAN, Mathematica, Pascal, Intel 80x86 assembly language, BASIC, COBOL.

PUBLICATIONS AND PRESENTATIONS

Refereed articles: 99 (42 experimental, 57 theoretical)

Conference proceedings (non-refereed): 36 (21 experimental, 15 theoretical)

Invited talks: 91 (78 research, 13 lectures/pedagogy/outreach)

Contributed talks: Author or coauthor of over 130 additional *contributed talks* at conferences, workshops, professional society meetings, and collaboration meetings.

ARTICLES (REFEREED)

including refereed journal articles, refereed conference proceedings, and invited book chapters

Publications are listed below separately as Experimental or Theoretical, based on the principal nature of my contribution.

(a) Experimental

1. ***B(E2) values and phase coexistence in ^{152}Sm***
N. V. Zamfir, R. F. Casten, **M. A. Caprio**, C. W. Beausang, R. Krücken, J. R. Novak, J. R. Cooper, G. Cata-Danil, and C. J. Barton, Phys. Rev. C **60**, 054312 (1999)
2. ***Evidence for superdeformation in $^{149,150}\text{Dy}$: Onset of the $Z = 66$ deformed shell closure?***
D. E. Appelbe, C. W. Beausang, C. J. Barton, **M. A. Caprio**, R. F. Casten, J. Cederkäll, J. R. Cooper, R. Krücken, J. R. Novak, N. V. Zamfir, and Z. Wang, Phys. Rev. C **61**, 037303 (2000)
3. ***The YRAST Ball array***
C. W. Beausang, C. J. Barton, **M. A. Caprio**, R. F. Casten, J. R. Cooper, R. Krücken, B. Liu, J. R. Novak, Z. Wang, M. Wilhelm, A. N. Wilson, N. V. Zamfir, and A. Zilges, Nucl. Instrum. Meth. A **452**, 431 (2000)
4. ***Nuclear structure of ^{196}Au : More evidence for its supersymmetric description***
J. Gröger, J. Jolie, R. Krücken, C. W. Beausang, **M. A. Caprio**, R. F. Casten, J. Cederkäll, J. R. Cooper, F. Corminboeuf, L. Genilloud, G. Graw, C. Günther, M. de Huu, A. I. Levon, A. Metz, J. R. Novak, N. Warr, and T. Wendel, Phys. Rev. C **62**, 064304 (2000)
5. ***Chiral doublet structures in odd-odd $N = 75$ isotones: Chiral vibrations***
K. Starosta, T. Koike, C. J. Chiara, D. B. Fossan, D. R. LaFosse, A. A. Hecht, C. W. Beausang, **M. A. Caprio**, J. R. Cooper, R. Krücken, J. R. Novak, N. V. Zamfir, K. E. Zyranski, D. J. Hartley, D. L. Balabanski, J.-Y. Zhang, S. Frauendorf, and V. I. Dimitrov, Phys. Rev. Lett. **86**, 971 (2001)
6. ***Mass measurements of ^{70}Se , ^{71}Se , ^{72}Br , and ^{73}Br***
B. E. Tomlin, C. J. Barton, N. V. Zamfir, **M. A. Caprio**, R. L. Gill, R. Krücken, J. R. Novak, J. R. Cooper, K. E. Zyranski, G. Cata-Danil, C. W. Beausang, A. Wolf, N. A. Pietralla, H. Newman, J. Cederkäll, B. Liu, Z. Wang, R. F. Casten, and D. S. Brenner, Phys. Rev. C **63**, 034314 (2001)
7. ***Evidence for chiral symmetry breaking in ^{136}Pm and ^{138}Eu***
A. A. Hecht, C. W. Beausang, K. E. Zyranski, D. L. Balabanski, C. J. Barton, **M. A. Caprio**, R. F. Casten, J. R. Cooper, D. J. Hartley, R. Krücken, D. Meyer, H. Newman, J. R. Novak, E. S. Paul, N. Pietralla, A. Wolf, N. V. Zamfir, J.-Y. Zhang, and F. Dönau, Phys. Rev. C **63**, 051302(R) (2001)
8. ***Two-phonon γ -vibrational strength in osmium nuclei***
C. Y. Wu, D. Cline, A. B. Hayes, M. W. Simon, R. Krücken, J. R. Cooper, C. J. Barton, C. W. Beausang, C. Bialik, **M. A. Caprio**, R. F. Casten, A. A. Hecht, H. Newman, J. Novak, N. Pietralla, K. Zyranski, and N. V. Zamfir, Phys. Rev. C **64**, 014307 (2001)

9. **Lifetimes in neutron-rich fission fragments using the differential recoil distance method**
R. Krücken, W.-T. Chou, J. R. Cooper, C. W. Beausang, C. J. Barton, **M. A. Caprio**, R. F. Casten, A. A. Hecht, J. R. Novak, N. Pietralla, A. Wolf, and N. V. Zamfir, Phys. Rev. C **64**, 017305 (2001)
10. **High-spin states in ^{203}Rn**
H. Newman, J. R. Novak, C. W. Beausang, C. J. Barton, **M. A. Caprio**, R. F. Casten, J. R. Cooper, A. A. Hecht, R. Krücken, N. Pietralla, A. Wolf, N. V. Zamfir, J.-Y. Zhang, K. E. Zyromski, I. Birriel, and J. Saladin, Phys. Rev. C **64**, 027304 (2001)
11. **Coulomb excitation of the 2_{ms}^+ state of ^{96}Ru in inverse kinematics**
N. Pietralla, C. J. Barton, R. Krücken, C. W. Beausang, **M. A. Caprio**, R. F. Casten, J. R. Cooper, A. A. Hecht, H. Newman, J. R. Novak, and N. V. Zamfir, Phys. Rev. C **64**, 031301(R) (2001)
12. **Shape/phase coexistence in ^{156}Dy**
M. A. Caprio, N. V. Zamfir, R. F. Casten, C. J. Barton, C. W. Beausang, J. R. Cooper, A. A. Hecht, R. Krücken, H. Newman, J. R. Novak, N. Pietralla, A. Wolf, and K. E. Zyromski, *refereed proceedings*, Rom. J. Phys. **46**, 41 (2001)
13. **Lifetimes of quasideuteron configurations in the odd-odd $N = Z$ nucleus $^{50}_{25}\text{Mn}_{25}$**
N. Pietralla, R. Krücken, C. J. Barton, C. W. Beausang, **M. A. Caprio**, R. F. Casten, J. R. Cooper, A. A. Hecht, J. R. Novak, N. V. Zamfir, A. Lisetskiy, and A. Schmidt, Phys. Rev. C **65**, 024317 (2002)
14. **^{102}Pd : An $E(5)$ nucleus?**
N. V. Zamfir, **M. A. Caprio**, R. F. Casten, C. J. Barton, C. W. Beausang, Z. Berant, D. S. Brenner, W. T. Chou, J. R. Cooper, A. A. Hecht, R. Krücken, H. Newman, J. R. Novak, N. Pietralla, A. Wolf, and K. E. Zyromski, Phys. Rev. C **65**, 044325 (2002)
15. **Coulomb excitation of radioactive $^{132,134,136}\text{Te}$ beams and the low $B(E2)$ value of ^{136}Te**
D. C. Radford, C. Baktash, J. R. Beene, B. Fuentes, A. Galindo-Uribarri, C. J. Gross, P. A. Hausladen, T. A. Lewis, P. E. Mueller, E. Padilla, D. Shapira, D. W. Stracener, C.-H. Yu, C. J. Barton, **M. A. Caprio**, L. Coraggio, A. Covello, A. Gargano, D. J. Hartley, and N. V. Zamfir, Phys. Rev. Lett. **88**, 222501 (2002)
16. **$B(E2)$ values in ^{150}Nd and the critical point symmetry $X(5)$**
R. Krücken, B. Albanna, C. Bialik, R. F. Casten, J. R. Cooper, A. Dewald, N. V. Zamfir, C. J. Barton, C. W. Beausang, **M. A. Caprio**, A. A. Hecht, T. Klug, J. R. Novak, N. Pietralla, and P. von Brentano, Phys. Rev. Lett. **88**, 232501 (2002)
17. **Lifetime and $B(E2)$ values for the 3_1^+ level in ^{152}Sm**
N. V. Zamfir, H. G. Börner, N. Pietralla, R. F. Casten, Z. Berant, C. J. Barton, C. W. Beausang, D. S. Brenner, **M. A. Caprio**, J. R. Cooper, A. A. Hecht, M. Krtička, R. Krücken, P. Mutti, J. R. Novak, and A. Wolf, Phys. Rev. C **65**, 067305 (2002)
18. **Properties of the low-lying $K^\pi = 0^+$ excitations in ^{162}Er**
M. A. Caprio, N. V. Zamfir, R. F. Casten, G. C. Ball, K. P. Jackson, P.-A. Amaudruz, and J.-C. Thomas, Phys. Rev. C **66**, 014307 (2002)
19. **High- j proton and neutron alignments in γ -soft ^{101}Ru**
A. D. Yamamoto, P. H. Regan, C. W. Beausang, F. R. Xu, **M. A. Caprio**, R. F. Casten, G. Gürdal, A. A. Hecht, C. Hutter, R. Krücken, S. D. Langdown, D. Meyer, J. J. Ressler, and N. V. Zamfir, Phys. Rev. C **66**, 024302 (2002)
20. **Structure of low-lying states in ^{128}Ba from γ - γ angular correlations and polarization measurements**
A. Wolf, N. V. Zamfir, **M. A. Caprio**, Z. Berant, D. S. Brenner, N. Pietralla, R. L. Gill, R. F. Casten, C. W. Beausang, R. Krücken, K. E. Zyromski, C. J. Barton, J. R. Cooper, A. A. Hecht, H. Newman, J. R. Novak, and J. Cederkäll, Phys. Rev. C **66**, 024323 (2002)
21. **Low-spin structure of ^{156}Dy through γ -ray spectroscopy**
M. A. Caprio, N. V. Zamfir, R. F. Casten, C. J. Barton, C. W. Beausang, J. R. Cooper, A. A. Hecht, R. Krücken, H. Newman, J. R. Novak, N. Pietralla, A. Wolf, and K. E. Zyromski, Phys. Rev. C **66**, 054310 (2002)

22. **$B(E2)$ values from low-energy coulomb excitation at an isol facility: The $N = 80, 82$ Te isotopes**
C. J. Barton, **M. A. Caprio**, D. Shapira, N. V. Zamfir, D. S. Brenner, R. L. Gill, T. A. Lewis, J. R. Cooper, R. F. Casten, C. W. Beausang, R. Krücken, and J. R. Novak, Phys. Lett. B **551**, 269 (2003)
23. **Measurement of 2_1^+ level lifetimes in ^{162}Yb and ^{162}Er by fast electronic scintillation timing**
M. A. Caprio, N. V. Zamfir, E. A. McCutchan, R. F. Casten, Z. Berant, H. Amro, C. J. Barton, C. W. Beausang, D. S. Brenner, J. R. Cooper, R. L. Gill, G. Gürdal, A. A. Hecht, C. Hutter, R. Krücken, D. A. Meyer, J. R. Novak, N. Pietralla, P. H. Regan, and J. J. Ressler, Eur. Phys. J. A **16**, 177 (2003)
24. **Detailed γ -ray spectroscopy of ^{55}Cr and ^{56}Cr : Confirmation of the subshell closure at $N = 32$**
D. E. Appelbe, C. J. Barton, M. H. Muikku, J. Simpson, D. D. Warner, C. W. Beausang, **M. A. Caprio**, J. R. Cooper, J. R. Novak, N. V. Zamfir, R. A. E. Austin, J. A. Cameron, C. Malcolmson, J. C. Waddington, and F. R. Xu, Phys. Rev. C **67**, 034309 (2003)
25. **Mass measurement of ^{80}Y by β - γ coincidence spectroscopy**
C. J. Barton, D. S. Brenner, N. V. Zamfir, **M. A. Caprio**, A. Aprahamian, M. C. Wiescher, C. W. Beausang, Z. Berant, R. F. Casten, J. R. Cooper, R. L. Gill, R. Krücken, J. R. Novak, N. Pietralla, M. Shawcross, A. Teymurazyan, and A. Wolf, Phys. Rev. C **67**, 034310 (2003)
26. **Competing core and single particle excitations in the 2_1^+ state in ^{44}Ca**
M. J. Taylor, N. Benczer-Koller, G. Kumbartzki, T. J. Mertzimekis, S. J. Q. Robinson, Y. Y. Sharon, L. Zamick, A. E. Stuchbery, C. Hutter, C. W. Beausang, J. J. Ressler, and **M. A. Caprio**, Phys. Lett. B **559**, 187 (2003)
27. **Signature for vibrational to rotational evolution along the yrast line**
P. H. Regan, C. W. Beausang, N. V. Zamfir, R. F. Casten, J.-Y. Zhang, A. D. Yamamoto, **M. A. Caprio**, G. Gürdal, A. A. Hecht, C. Hutter, R. Krücken, S. D. Langdown, D. A. Meyer, and J. J. Ressler, Phys. Rev. Lett. **90**, 152502 (2003)
28. **$B(E2)$ values and the search for the critical point symmetry X(5) in ^{104}Mo and ^{106}Mo**
C. Hutter, R. Krücken, A. Aprahamian, C. J. Barton, C. W. Beausang, **M. A. Caprio**, R. F. Casten, W.-T. Chou, R. M. Clark, D. Cline, J. R. Cooper, M. Cromaz, A. A. Hecht, A. O. Macchiavelli, N. Pietralla, M. Shawcross, M. A. Stoyer, C. Y. Wu, and N. V. Zamfir, Phys. Rev. C **67**, 054315 (2003)
29. **Collectivity at high spins in ^{156}Dy**
P. Petkov, A. Dewald, O. Möller, B. Saha, A. Fitzler, K. Jessen, D. Tonev, T. Klug, S. Heinze, J. Jolie, P. von Brentano, D. Bazzacco, C. Ur, E. Farnea, M. Axiotis, S. Lunardi, C. Rossi-Alvarez, G. de Angelis, D. R. Napoli, N. Marginean, T. Martinez, **M. A. Caprio**, and R. F. Casten, Phys. Rev. C **68**, 034328 (2003)
30. **Evidence for chiral symmetry breaking in ^{140}Eu ?**
A. A. Hecht, C. W. Beausang, H. Amro, C. J. Barton, Z. Berant, **M. A. Caprio**, R. F. Casten, J. R. Cooper, D. J. Hartley, R. Krücken, D. A. Meyer, H. Newman, J. R. Novak, N. Pietralla, J. J. Ressler, A. Wolf, N. V. Zamfir, J.-Y. Zhang, and K. E. Zyromski, Phys. Rev. C **68**, 054310 (2003)
31. **Low spin states in ^{162}Yb and the X(5) critical point symmetry**
E. A. McCutchan, N. V. Zamfir, **M. A. Caprio**, R. F. Casten, H. Amro, C. W. Beausang, D. S. Brenner, A. A. Hecht, C. Hutter, S. D. Langdown, D. A. Meyer, P. H. Regan, J. J. Ressler, and A. D. Yamamoto, Phys. Rev. C **69**, 024308 (2004)
32. **Transition from the seniority regime to collective motion**
J. J. Ressler, R. F. Casten, N. V. Zamfir, C. W. Beausang, R. B. Cakirli, H. Ai, H. Amro, **M. A. Caprio**, A. A. Hecht, A. Heinz, S. D. Langdown, E. A. McCutchan, D. A. Meyer, C. Plettner, P. H. Regan, M. J. S. Sciacchitano, and A. D. Yamamoto, Phys. Rev. C **69**, 034317 (2004)
33. **g factor of the 2_1^+ state of ^{164}Yb**
Z. Berant, A. Wolf, N. V. Zamfir, **M. A. Caprio**, D. S. Brenner, N. Pietralla, R. L. Gill, R. F. Casten, C. W. Beausang, R. Krücken, C. J. Barton, J. R. Cooper, A. A. Hecht, D. M. Johnson, J. R. Novak, H. Cheng, B. F. Albanna, and G. Gürdal, Phys. Rev. C **69**, 034320 (2004)

34. **Isomer decay tagging in the heavy nuclei: ^{210}Ra and ^{209}Ra**
J. J. Ressler, C. W. Beausang, H. Ai, H. Amro, **M. A. Caprio**, R. F. Casten, A. A. Hecht, S. D. Langdown, E. A. McCutchan, D. A. Meyer, P. H. Regan, M. J. S. Sciacchitano, A. Yamamoto, and N. V. Zamfir, Phys. Rev. C **69**, 034331 (2004)
35. **Test of calculations with single-particle density dependent pairing in ^{132}Te**
R. O. Hughes, N. V. Zamfir, R. F. Casten, D. C. Radford, C. J. Barton, C. Baktash, **M. A. Caprio**, A. Galindo-Uribarri, C. J. Gross, P. A. Hausladen, E. A. McCutchan, J. J. Ressler, D. Shapira, D. W. Stracener, and C.-H. Yu, Phys. Rev. C **69**, 051303(R) (2004)
36. **Possible assignment of chiral twin bands in ^{188}Ir**
D. L. Balabanski, M. Danchev, D. J. Hartley, L. L. Riedinger, O. Zeidan, J.-Y. Zhang, C. J. Barton, C. W. Beausang, **M. A. Caprio**, R. F. Casten, J. R. Cooper, A. A. Hecht, R. Krücken, J. R. Novak, N. V. Zamfir, and K. E. Zyranski, Phys. Rev. C **70**, 044305 (2004)
37. **γ -ray spectroscopy of ^{166}Hf : X(5) in $N > 90$?**
E. A. McCutchan, N. V. Zamfir, R. F. Casten, **M. A. Caprio**, H. Ai, H. Amro, C. W. Beausang, A. A. Hecht, D. A. Meyer, and J. J. Ressler, Phys. Rev. C **71**, 024309 (2005)
38. **γ -ray spectroscopy of ^{132}Te through β decay of a ^{132}Sb radioactive beam**
R. O. Hughes, N. V. Zamfir, D. C. Radford, C. J. Gross, C. J. Barton, C. Baktash, **M. A. Caprio**, R. F. Casten, A. Galindo-Uribarri, P. A. Hausladen, E. A. McCutchan, J. J. Ressler, D. Shapira, D. W. Stracener, and C.-H. Yu, Phys. Rev. C **71**, 044311 (2005)
39. **Electromagnetic transition strengths in ^{156}Dy**
O. Möller, A. Dewald, P. Petkov, B. Saha, A. Fitzler, K. Jessen, D. Tonev, T. Klug, S. Heinze, J. Jolie, P. von Brentano, D. Bazzacco, C. A. Ur, E. Farnea, M. Axiotis, S. Lunardi, G. de Angelis, D. R. Napoli, N. Marginean, T. Martinez, **M. A. Caprio**, and R. F. Casten, Phys. Rev. C **74**, 024313 (2006)
40. **Lifetimes and electromagnetic transition strengths in ^{155}Dy**
P. Petkov, M. S. Yavahchova, O. Möller, A. Dewald, D. Tonev, B. Saha, A. Fitzler, K. Jessen, T. Klug, S. Heinze, J. Jolie, P. von Brentano, N. Goutev, D. Bazzacco, C. A. Ur, E. Farnea, M. Axiotis, S. Lunardi, G. de Angelis, D. R. Napoli, N. Marginean, T. Martinez, and **M. A. Caprio**, Phys. Rev. C **88**, 034323 (2013)
41. **Low-lying bands with different quadrupole deformation in ^{155}Dy**
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D. C. Radford, C. Baktash, C. J. Barton, J. Batchelder, J. R. Beene, C. R. Bingham, **M. A. Caprio**, M. Danchev, B. Fuentes, A. Galindo-Uribarri, J. G. del Campo, C. J. Gross, M. L. Halbert, D. J. Hartley, P. Hausladen, J. K. Hwang, W. Krolas, Y. Larochele, J. F. Liang, P. E. Mueller, E. Padilla, J. Pavan, A. Piechaczek, D. Shapira, D. W. Stracener, R. L. Varner, A. Woehr, C.-H. Yu, and N. V. Zamfir, *Nucl. Phys. A* **752**, 264c (2005)
20. **Coulomb excitation and transfer reactions with neutron-rich radioactive beams**
D. C. Radford, C. Baktash, C. J. Barton, J. Batchelder, J. R. Beene, C. R. Bingham, **M. A. Caprio**, M. Danchev, B. Fuentes, A. Galindo-Uribarri, J. G. del Campo, C. J. Gross, M. L. Halbert, D. J. Hartley, P. Hausladen, J. K. Hwang, W. Krolas, Y. Larochele, J. F. Liang, P. E. Mueller, E. Padilla, J. Pavan, A. Piechaczek, D. Shapira, D. W. Stracener, R. L. Varner, A. Woehr, C.-H. Yu, and N. V. Zamfir, *Eur. Phys. J. A* **25**, 383 (2005)
21. **^{132}Te and single-particle density dependent pairing**
N. V. Zamfir, R. O. Hughes, R. F. Casten, D. C. Radford, C. J. Barton, C. Baktash, **M. A. Caprio**, A. Galindo-Uribarri, C. J. Gross, P. A. Hausladen, E. A. McCutchan, J. J. Ressler, D. Shapira, D. W. Stracener, and C.-H. Yu, *Eur. Phys. J. A* **25**, 389 (2005)

(b) *Theoretical*

22. **Finite well solution for the E(5) Hamiltonian**
M. A. Caprio, in *Computational and Group Theoretical Methods in Physics*, edited by J. Escher, O. Castaños, J. G. Hirsch, S. Pittel, and G. Stoitcheva (World Scientific, Singapore, 2004) p. 221
23. **Finite well solutions for the E(5) and X(5) Hamiltonians**
M. A. Caprio, in *Symmetries in Nuclear Structure*, edited by A. Vitturi and R. F. Casten (World Scientific, Singapore, 2004) p. 211
24. **The transition between axial and triaxial structure in the IBM-2**
M. A. Caprio, in *Nuclear Physics, Large and Small: International Conference on Microscopic Studies of Collective Phenomena*, AIP Conf. Proc. No. 726, edited by R. Bijker, R. F. Casten, and A. Frank (AIP, Melville, New York, 2004) p. 215
25. **Quantum phase transitions in two-fluid systems**
M. A. Caprio, in *Nuclei and Mesoscopic Physics*, AIP Conf. Proc. No. 777, edited by V. Zelevinsky (AIP, Melville, New York, 2005) p. 199
26. **Triaxiality, chirality, and γ -softness**
K. Starosta, **M. A. Caprio**, T. Koike, R. Krücken, and C. Vaman, *Acta Phys. Hungarica A* **25**, 181 (2006)

27. **Phase structure of the proton-neutron system**
M. A. Caprio, in *Symmetries and Low-Energy Phase Transitions in Nuclear Structure Physics*, edited by G. Lo Bianco (U. Camerino, 2006) p. 8
28. **Proton-neutron asymmetry in exotic nuclei**
M. A. Caprio, in *Opportunities with Exotic Beams*, Proceedings from the Institute for Nuclear Theory, Vol. 15, edited by T. Duguet, H. Esbensen, K. M. Nollett, and C. D. Roberts (World Scientific, Singapore, 2007) p. 81
29. **Nuclear structure and triaxiality with the algebraic collective model**
M. A. Caprio, D. J. Rowe, and T. A. Welsh, in *Capture Gamma-Ray Spectroscopy and Related Topics*, AIP Conf. Proc. No. 1090, edited by A. Blazhev, J. Jolie, N. Warr, and A. Zilges (AIP, Melville, New York, 2009) p. 534
30. **Generalized seniority in a major shell with realistic interactions**
M. A. Caprio, F. Q. Luo, K. Cai, Ch. Constantinou, and V. Hellemans, in *Beauty in Physics: Theory and Experiment*, AIP Conf. Proc. No. 1488, edited by R. Bijker *et al.* (AIP, Melville, New York, 2012) p. 212
31. **Tidal wave in ^{102}Pd : Rotating condensate of up to seven d -bosons**
S. Frauendorf, **M. A. Caprio**, and J. Sun, in *Capture Gamma-Ray Spectroscopy and Related Topics*, edited by P. E. Garrett and B. Hadinia (World Scientific, Singapore, 2013) p. 158
32. **Halo nuclei with the Coulomb-Sturmian basis**
M. A. Caprio, P. Maris, and J. P. Vary, in *Proceedings of the International Conference Nuclear Theory in the Supercomputing Era 2013*, edited by A. M. Shirokov and A. I. Mazur (Pacific National University, Khabarovsk, Russia, 2014) p. 325
33. ***Ab initio* no core shell model — Recent results and further prospects**
J. P. Vary, P. Maris, H. Potter, **M. A. Caprio**, R. Smith, S. Binder, A. Calci, J. Langhammer, R. Roth, H. M. Aktulga, E. Ng, C. Yang, D. Oryspayev, M. Sosonkina, and U. Catalyurek, in *Proceedings of the International Conference Nuclear Theory in the Supercomputing Era 2014*, edited by A. M. Shirokov and A. I. Mazur (Pacific National University, Khabarovsk, Russia, 2016) p. 154
34. **Quantum phase transitions and excited-state scaling in bosonic and fermionic pairing models**
M. A. Caprio, in *Symmetries and Order: Algebraic Methods in Many Body Systems*, AIP Conf. Proc. No. 2150, edited by R. Murayama (AIP, Melville, New York, 2019) p. 020016
35. **Robust *ab initio* predictions for nuclear rotational structure in the Be isotopes**
M. A. Caprio, P. J. Fasano, J. P. Vary, P. Maris, and J. Hartley, in *Proceedings of the International Conference Nuclear Theory in the Supercomputing Era 2018*, edited by A. M. Shirokov and A. I. Mazur (Pacific National University, Khabarovsk, Russia, 2019) p. 250
36. **Convergence in the symplectic no-core configuration interaction framework**
A. E. McCoy, **M. A. Caprio**, and T. Dytrych, in *Proceedings of the International Conference Nuclear Theory in the Supercomputing Era 2018*, edited by A. M. Shirokov and A. I. Mazur (Pacific National University, Khabarovsk, Russia, 2019) p. 293

INVITED TALKS

at conferences, professional society meetings, workshops, advanced schools, universities, and national laboratories

Invited talks are listed below separately as Research or Lectures/Pedagogy/Outreach.

(a) Research

1. **Experiments on critical point nuclei**
Seminar, *Argonne National Laboratory*, Argonne, Illinois, March 2002
2. **Experiments on critical point nuclei**
International Conference on Nuclear Structure, Moran, Wyoming, May 2002
3. **Softness to deformation in transitional nuclear structure**
Seminar, *European Centre for Theoretical Studies in Nuclear Physics and Related Areas*, Villazzano (Trento), Italy, July 2003
4. **Quantum phase transitions in two-fluid systems**
Workshop on Nuclei and Mesoscopic Physics, East Lansing, Michigan, October 2004
5. **Phase structure of the proton-neutron system**
Seminar, *State University of New York at Stony Brook*, Stony Brook, New York, February 2005
6. **Dynamical symmetries in proton-neutron systems**
Gordon Research Meeting on Nuclear Chemistry, New London, New Hampshire, June/July 2005
7. **Phase structure of the proton-neutron system**
Symmetries and Low-Energy Phase Transitions in Nuclear Structure Physics, Camerino, Italy, October 2005
8. **Phase structure of the proton-neutron system**
Seminar, *Institute for Nuclear Theory, University of Washington*, Seattle, Washington, January 2006
9. **Phase structure of a two-fluid bosonic system**
Seminar, *Rutgers University*, Piscataway, New Jersey, January 2006
10. **Proton-neutron asymmetry in nuclei**
Seminar, *University of Notre Dame*, Notre Dame, Indiana, March 2006
11. **Collective nuclear structure and proton-neutron asymmetry**
Colloquium, *Saint Mary's University*, Halifax, Nova Scotia, Canada, May 2006
12. **Proton-neutron asymmetry in exotic nuclei**
Rare Isotope Accelerator Theory Meeting, Argonne, Illinois, April 2006
13. **Proton-neutron asymmetry in nuclear structure**
Seminar, *University of York*, Heslington, York, United Kingdom, June 2006
14. **Excited state quantum phase transitions: Level density singularity and finite size scaling**
Workshop on Shape Phase Transitions and Critical Point Phenomena in Nuclei, Athens, Greece, November 2006
15. **Nuclei, quantum phase transitions, and mesoscopic systems**
Colloquium, *University of Notre Dame*, Notre Dame, Indiana, November 2006
16. **Nuclear quantum phase transitions**
Excellence in Basic and Applied Nuclear Science, Monterey, California, June 2007

17. **Excited state quantum phase transitions in pairing systems**
New Approaches in Nuclear Many-Body Theory, Seattle, Washington, October 2007
18. **Excited state quantum phase transitions in mesoscopic systems**
Mesoscopic Theory Lecture, *Michigan State University*, East Lansing, Michigan, November 2007
19. **Excited state quantum phase transitions**
Seminar, *Argonne National Laboratory*, Argonne, Illinois, December 2007
20. **Quantum phase transitions in finite many-body systems**
American Chemical Society, New Orleans, Louisiana, April 2008
21. **Algebraic methods for the bohr hamiltonian**
Seminar, *Università degli Studi di Padova*, Padova, Italy, May 2009
22. **Nuclear structure with the algebraic collective model**
Seminar, *University of York*, Heslington, York, United Kingdom, May 2009
23. **Phonon and multiphonon excitations by exact diagonalization of the bohr hamiltonian**
Gordon Research Meeting on Nuclear Chemistry, New London, New Hampshire, June 2009
24. **Coupling coefficients for SO(5) with applications to nuclear physics**
International Symposium Symmetries in Science XIV, Bregenz, Austria, July 2009
25. **Geometric models: New results, opportunities, and challenges**
Workshop on Shape Phase Transitions and Critical Point Phenomena in Nuclei, İstanbul, Turkey, September 2009
26. **Algebraic methods for the geometric hamiltonian**
Seminar, *Yale University*, New Haven, Connecticut, October 2009
27. **Algebraic methods for the nuclear geometric description**
APS April Meeting, Washington, District of Columbia, February 2010
28. **Symmetries in nuclei: Methods and applications**
Seminar, *Lawrence Livermore National Laboratory*, Livermore, California, August 2010
29. **Symmetries in nuclei: New methods and applications**
Seminar, *Michigan State University*, East Lansing, Michigan, November 2010
30. **Coupling coefficients for general subgroup chains**
Seminar, *Louisiana State University*, Baton Rouge, Louisiana, January 2011
31. **Symmetry methods for the nuclear shell model**
Seminar, *University of Wisconsin*, Madison, Wisconsin, March 2011
32. **Symmetry methods for the nuclear many-body problem**
Seminar, *University of Iowa*, Iowa City, Iowa, March 2011
33. **Symmetry methods for the nuclear shell model**
Seminar, *Iowa State University*, Ames, Iowa, March 2011
34. **Taming the nucleus: Symmetries and the computational scale explosion**
Colloquium, *Dartmouth College*, Hanover, New Hampshire, April 2011
35. **Symmetries in nuclei: New methods and applications**
APS April Meeting, Garden Grove, California, April/May 2011
36. **Quantum phase transitions in algebraic models**
Gordon Research Meeting on Nuclear Chemistry, New London, New Hampshire, June 2011

37. **Taming the computational scale explosion in the nuclear many-body problem**
Seminar, *University of Notre Dame*, Notre Dame, Indiana, May 2012
38. **Generalized seniority in a major shell with realistic interactions**
Beauty in Physics: Theory and Experiment, Cocoyoc, Mexico, May 2012
39. **The no-core shell model with general radial bases**
Horizons of Innovative Theories, Experiments, and Supercomputing in Nuclear Physics, New Orleans, Louisiana, June 2012
40. **The coulomb-sturmian basis for the nuclear many-body problem**
Seminar, *Lawrence Livermore National Laboratory*, Livermore, California, July 2012
41. **The no-core shell model with general radial bases**
Seminar, *Lawrence Berkeley National Laboratory*, Berkeley, California, July 2012
42. **The coulomb-sturmian basis for the nuclear many-body problem**
Seminar, *Yale University*, New Haven, Connecticut, November 2012
43. **The no-core shell model with general radial bases**
Seminar, *Rutgers University*, Piscataway, New Jersey, December 2012
44. **Convergence of nci calculations for light p -shell nuclei with the coulomb-sturmian basis**
International Meeting on Nuclear Theory in the Supercomputing Era, Ames, Iowa, May 2013
45. **Halo nuclei with the coulomb-sturmian basis**
Seminar, *Lawrence Livermore National Laboratory*, Livermore, California, August 2013
46. **The coulomb-sturmian basis in *ab initio* no-core configuration interaction calculations**
Seminar, *Lawrence Berkeley National Laboratory*, Berkeley, California, August 2013
47. ***Ab initio* emergence of rotational nuclear structure**
Seminar, *Lawrence Berkeley National Laboratory*, Berkeley, California, July 2014
48. **Emergence of rotation in *ab initio* no-core configuration interaction calculations**
Seminar, *Lawrence Livermore National Laboratory*, Livermore, California, July 2014
49. ***Ab initio* emergence of rotational nuclear structure**
General Seminar, *Institutul Național de Fizică și Inginerie Nucleară Horia Hulubei*, București-Măgurele, Romania, August 2014
50. **Emergence of rotational collectivity in *ab initio* no-core configuration interaction calculations**
Advanced Many-Body and Statistical Methods in Mesoscopic Systems II, Brașov, Romania, September 2014
51. **The emergence of nuclear rotational excitations**
Colloquium, *University of Oklahoma*, Norman, Oklahoma, November 2014
52. **Emergence of nuclear rotation in *ab initio* calculations**
Seminar, *Yale University*, New Haven, Connecticut, December 2014
53. ***Ab initio* emergence of rotational nuclear structure**
Seminar, *Michigan State University*, East Lansing, Michigan, March 2015
54. ***Ab initio* emergence of rotation in nuclei**
Seminar, *Peking University*, Beijing, China, July 2015
55. ***Ab initio* emergence of rotation in nuclei**
Seminar, *Huzhou University*, Huzhou, China, July 2015

56. ***Ab initio* emergence of rotation in nuclei**
Seminar, *Shandong University*, Weihai, China, July 2015
57. **Nuclear rotation in *ab initio* no-core configuration interaction calculations**
CUSTIPEN workshop, *Advances in computations of nuclear structure and nuclear forces*, Beijing, China, August 2015
58. ***Ab initio* emergence of rotation in the Be isotopes**
CUSTIPEN workshop, *Properties of exotic nuclei and asymmetric nuclear matter*, Lanzhou, China, August 2015
59. ***Ab initio* emergence of rotation in light nuclei**
Seminar, *Lawrence Livermore National Laboratory*, Livermore, California, October 2015
60. ***Ab initio* emergence of rotation in light nuclei**
Seminar, *Ohio State University*, Columbus, Ohio, November 2015
61. ***Ab initio* emergence of rotation in light nuclei**
Seminar, *Ohio University*, Athens, Ohio, November 2015
62. **Nuclei from scratch: *Ab initio* calculations and the emergence of rotation**
Colloquium, *Illinois State University*, Normal, Illinois, November 2015
63. ***Ab initio* structure of light nuclei with a natural orbital basis**
Seminar, *Nuclear Physics Institute, Czech Academy of Sciences*, Řež, Czech Republic, September 2016
64. **Natural orbitals for *ab initio* calculations of light nuclei**
Seminar, *Institut für Kernphysik, Technische Universität Darmstadt*, Darmstadt, Germany, September 2016
65. **Natural orbitals for *ab initio* calculations**
CUSTIPEN-IMP-PKU Workshop on Physics of Exotic Nuclei, Huizhou, China, December 2016
66. **Symplectic no-core configuration interaction framework for *ab initio* nuclear structure**
Advanced many-body and statistical methods in mesoscopic systems, Buşteni, Romania, September 2017
67. **Nuclei from scratch: *Ab initio* nuclear structure and emergent symmetries**
Seminar, *Vietnam National University, University of Science*, Hà Nội, Vietnam, October 2017
68. **Symplectic no-core configuration interaction framework for *ab initio* nuclear structure**
Seminar, *TRIUMF*, Vancouver, British Columbia, October 2017
69. **Symplectic no-core configuration interaction framework for *ab initio* nuclear structure**
Seminar, *Michigan State University*, East Lansing, Michigan, November 2017
70. **Symplectic symmetry in *ab initio* nuclear structure**
Seminar, *Lawrence Berkeley National Laboratory*, Berkeley, California, February 2018
71. ***Ab initio* nuclear structure and symplectic symmetry**
Seminar, *Institute of Physics, Academia Sinica*, Taipei, Taiwan, May 2018
72. **Symplectic symmetry in *ab initio* nuclear structure**
Seminar, *East China Normal University*, Shanghai, China, May 2018
73. **Symplectic symmetry in *ab initio* nuclear structure**
Seminar, *Peking University*, Beijing, China, June 2018
74. **Symplectic symmetry in *ab initio* nuclear structure**
Notre Dame-China Symposium on Exotic Nuclear Structures, Beijing, China, June 2018

- 75. **Symplectic no-core configuration interaction framework for *ab initio* nuclear structure**
FRIB Theory Alliance workshop, *From Bound States to the Continuum: Connecting Bound State Calculations with Scattering and Reaction Theory*, East Lansing, Michigan, June 2018
- 76. **Excited state quantum phase transitions in two-level systems**
Symmetries and Order: Algebraic Methods in Many Body Systems, New Haven, Connecticut, October 2018
- 77. **Predictions for nuclear rotational structure from *ab initio* calculations**
International Meeting on Nuclear Theory in the Supercomputing Era, Daejeon, Republic of Korea, November 2018
- 78. **Emergent dynamical symmetry in the nuclear many-body system from its *ab initio* description**
Seminar, *University of Maryland*, College Park, Maryland, October 2019

(b) *Lectures/Pedagogy/Outreach*

- 79. **Modern trends in physics education**
Panelist, Yale Physics Alumni Meeting, *Today's Physics for Tomorrow's World*, New Haven, Connecticut, November 2008
- 80. **Symmetries and the geometric description of nuclear structure. i. the geometric description**
Lecture, *The Seventh International Balkan School on Nuclear Physics: Nuclear Structure Challenges with Radioactive Beams*, Adrasan, Turkey, September 2010
- 81. **Symmetries and the geometric description of nuclear structure. ii. symmetries in the nuclear problem**
Lecture, *The Seventh International Balkan School on Nuclear Physics: Nuclear Structure Challenges with Radioactive Beams*, Adrasan, Turkey, September 2010
- 82. **Symmetries in nuclei: From isospin to rotations in five dimensions**
Seminar, *Grinnell College*, Grinnell, Iowa, April 2011
- 83. **Computational problem solving in the undergraduate physics major**
Cottrell Scholar Meeting, Tucson, Arizona, July 2011
- 84. **Geometric collective models**
Lecture, *TALENT Course: Theory for Exploring Nuclear Structure Experiments*, Caen, France, August 2014
- 85. **Emergence of collective behavior from *ab initio* methods**
Lecture, *TALENT Course: Theory for Exploring Nuclear Structure Experiments*, Caen, France, August 2014
- 86. **Graduate studies in your future**
Conference Experience for Undergraduates, *APS Division of Nuclear Physics*, Pittsburgh, Pennsylvania, October 2017
- 87. **Scientific writing: What I am trying to say is...**
Junior Researcher Workshop, *JINA-CEE Frontiers in Nuclear Astrophysics*, Notre Dame, Indiana, May 2018
- 88. **Nuclear structure theory. I. Phenomena and approaches**
Lecture, *National Nuclear Physics Summer School*, New Haven, Connecticut, June 2018
- 89. **Nuclear structure theory. II. Pairing and deformation**
Lecture, *National Nuclear Physics Summer School*, New Haven, Connecticut, June 2018
- 90. **Nuclear structure theory. III. From collective models to *ab initio* nuclear structure**
Lecture, *National Nuclear Physics Summer School*, New Haven, Connecticut, June 2018
- 91. **Graduate studies in your future**
Conference Experience for Undergraduates, *APS Division of Nuclear Physics*, Crystal City, Virginia, October 2019