

# KAREEM EL-BADRY

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## RESEARCH INTERESTS

binary stars, stellar mass black holes, white dwarfs;  
near-field cosmology, galactic archaeology, globular clusters;  
galaxy formation, low-mass galaxies, stellar feedback

## EDUCATION

Ph.D., Astrophysics, University of California, Berkeley	2021 (anticipated)
Advisors: Eliot Quataert, Dan Weisz	
M.A., Astrophysics, University of California, Berkeley	2018
B.S., Astrophysics, <i>summa cum laude</i> , Yale University	2016
Advisor: Marla Geha	

## RESEARCH POSITIONS

Graduate Student, UC Berkeley	2016–
Kavli Summer Research Fellow, CCA, NYC	2018
Summer Visiting Researcher, MPIA, Heidelberg	2017 – 2020
Summer Undergraduate Research Fellow, Caltech	2015
Undergraduate Research Assistant, Yale	2015 – 2016
Dean's Summer Research Fellow, Yale	2014

## HONORS & AWARDS

Robert J. Trumpler Graduate Student Excellence Award, Berkeley	2020
CCAPP Price Prize in Cosmology and AstroParticle Physics	2018
NSF Graduate Research Fellowship	2016 – 2021
Berkeley Fellowship	2016 – 2018
Hellman Award for Graduate Study	2016 – 2018
George Beckwith Prize in Astronomy, Yale	2016
Phi Beta Kappa, Yale	2015
Jerry Inskeep Memorial Scholarship, Yale	2014

## AWARDED TELESCOPE TIME

CO-I: LBT 2×8.4 m - 3 hours (PI: David Martin)	2021
<i>Characterizing the atmosphere of the exoplanet-companion white dwarf TOI-1259B</i>	
PI: Las Cumbres Observatory 2×1 m - 1.5 nights	2021
<i>Spectral disentangling of a mass-transfer binary with NRES</i>	
PI: Lick Shane 3m - 10 nights	2021
<i>Characterization of mass-transfer binaries</i>	
PI: MPG/ESO La Silla 2.2m - 140 hours	2020
<i>Searching for detached black holes with FEROS</i>	
PI: Lick Shane 3m - 15 nights	2020
<i>A search for detached black holes in binaries</i>	
PI: MPG/ESO La Silla 2.2m - 60 hours	2020
<i>A search for detached black holes in binaries</i>	
PI: Lick Shane 3m - 5 nights	2020
<i>A search for detached black holes in binaries</i>	
CO-I: Keck - 2 nights (PI: Alexie Leauthaud)	2019
<i>Testing the Feedback-driven Breathing Mode in Dwarf Galaxies at <math>z \approx 0.1</math></i>	
CO-I: La Silla MPG 2.2 m - 150 hours (PI: Hans-Walter Rix)	2019

<i>Wide Binaries as Fundamental Calibrators of Galactic Archeology</i>	
CO-I: Magellan - 3 nights (PI: Yuan-Sen Ting)	2018
<i>The Chemical Homogeneity of Wide Binaries in Gaia DR2</i>	
CO-I: McDondald - 5 nights (PI: Keith Hawkins)	2018
<i>The Chemical Homogeneity of Wide Binaries in Gaia DR2</i>	
CO-I: Keck - 7 nights total (PI: Tucker Jones)	2017, 2018
<i>Dissecting Galaxy Formation and Testing Feedback Models on 100 pc Scales: An OSIRIS</i>	
<i>Survey of Lensed Galaxies at <math>z = 2</math></i>	
CO-I: Keck - 2.5 nights (PI: Dan Weisz)	2017
<i>Stellar Chemistry in Isolated Dwarf Galaxies</i>	
PI: Palomar Hale 200 inch - 1 night	2015
<i>Probing Radial Star-Formation Histories of Isolated Dwarf Galaxies</i>	
CO-I: Keck - 1 night (PI: Andrew Wetzel)	2015
<i>Constraining Star-Formation Quenching Mechanisms using Isolated Low-Mass Galaxies</i>	

## AWARDED SUPERCOMPUTING TIME

PI: NERSC Cori/KNL Early Access - 4.7 M cpu-hours	2017
<i>Simulating the Formation of Dwarf Galaxies</i>	

## OBSERVING EXPERIENCE

Public data – significant experience with data from Gaia, Kepler/K2, TESS, LAMOST, SDSS, ZTF	
Lick Shane telescope, KAST Spectrograph – 20 nights	2020-2021
Keck DEIMOS – 2.5 nights	2017
Palomar Hale telescope, Wide-Field IR Camera – 1 night	2015
Keck ESI – 3 nights	2015, 2016
WIYN, Hydra Multi-Fiber Spectrograph – 2 nights	2014
Arecibo, L-Band HI – 2 nights	2013, 2014

## JOURNAL REFEREE

A&A, A&AL, ApJ, ApJL, MNRAS, MNRASL, SCPMA	15 papers total; 2017 –
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## STUDENT MENTORING

Pranav Nagarajan (Berkeley undergrad)	2020–
<i>Mapping the Local Group with RR Lyrae stars</i>	
Nick Choksi (Berkeley undergrad; now Berkeley grad student)	2018 – 2019
<i>Forecasting high-redshift observations of globular cluster formation</i>	

## TEACHING EXPERIENCE

Co-Instructor, Astro 375, <i>Graduate Pedagogy</i> , UC Berkeley	2019, 2020
Sole Instructor, <i>Stellar Physics</i> , Hyeonpung High School, Daegu, South Korea	2019
Graduate Student Instructor, Astro 128, <i>Astronomy Data Lab</i> , UC Berkeley	2019, 2020, 2021
Course Designer, Astro 128, <i>Astronomy Data Lab</i> , UC Berkeley	2018, 2019, 2020
Graduate Student Instructor, Astro 160, <i>Stellar Physics</i> , UC Berkeley	2018
Graduate Student Instructor, Astro 7A, <i>Introduction to Astronomy</i> , UC Berkeley	2017
Graduate Student Instructor, Astro C12, <i>The Planets</i> , UC Berkeley	2017
Tutor & Grader, Math 120, <i>Multivariable Calculus</i> , Yale	2013 – 2016
Tutor, Math 111, <i>College Algebra</i> , Umpqua Community College	2013

## RECENT TALKS

<i>Better together: binary stars as probes of stellar evolution and fundamental physics</i> – Colloquium, U. Utah	2021
<i>Found: the cataclysmic variable progenitors of ultra-compact binaries</i> – Lunch talk, Berkeley	2020
<i>Emission-line stars, binary mass transfer, and dormant black holes</i> – Tea talk, Caltech	2020
<i>A companion-stripping origin for Be stars</i> – CIERA seminar, Northwestern	2020
<i>Emission-line stars, mass transfer, and the search for stellar-mass black holes</i> – Colloquium, Princeton	2020
<i>A stripped star a day keeps the black holes away</i> – Galaxy coffee, MPIA, Heidelberg	2020
<i>A stripped-companion origin for Be stars</i> – Bildsten group meeting, KITP	2020
<i>Caught in the act: a stripped-companion origin for Be stars</i> – Lunch talk, UC Berkeley	2020
<i>Be stars masquerading as black holes</i> – Special discussion on HR 6819, compact objects group, CCA	2020
<i>Black holes in detached binaries</i> – Virtual ZTF theory meeting	2020
<i>Wide binaries as probes of star formation and dynamical evolution</i> – Astronomy seminar, U. Chicago	2019
<i>Hunting for black holes in detached Galactic binaries</i> – KIPAC Tea Talk, SLAC	2019
<i>Separated at birth? An unexpected population of identical-twin binaries</i> – Lunch talk, UC Berkeley	2019
<i>Wide binaries as probes of star formation and evolution</i> – Astronomy seminar, Boston University	2019
<i>Wide binaries as dynamical probes</i> – Galaxies and cosmology seminar, Harvard CFA	2019
<i>Binary stars in wide-field surveys</i> – Tea talk, Caltech	2019
<i>Twin binaries</i> – The Milky Way 2019: LAMOST and other Leading Survey meeting, Yichang, China	2019
<i>Wide binaries as probes of star formation and evolution</i> – Charles University, Prague, Czech Republic	2019
<i>Wide binaries in 2019</i> – Universe of Binaries meeting, Telč, Czech Republic	2019
<i>Gas kinematics of low-mass galaxies</i> – CosmoDwarfs meeting, Durham, UK	2019
<i>Conduction and cooling in supernovae-driven superbubbles</i> – Galaxy coffee, MPIA, Heidelberg	2019
<i>A new model for superbubbles driven by clustered supernovae</i> – Lunch talk, UC Berkeley	2019
<i>Successes and challenges in modeling low-mass galaxies</i> – FLASH seminar, UC Santa Cruz	2019
<i>Successes and challenges in modeling low-mass galaxies</i> – Cosmology seminar, UC Davis	2019
<i>The globular cluster systems of low-mass halos</i> – Lorentz Center workshop, Leiden, Netherlands	2019
<i>Feedback in low-mass galaxies at high redshift</i> – Near/Far workshop, Napa, CA	2018
<i>White dwarf demographics with Gaia</i> – Lunch talk, UC Berkeley	2018
<i>The binary fraction and metallicity</i> – GSPS, UC Berkeley	2018
<i>Dwarf galaxies as laboratories for astrophysics and cosmology</i> – CCAPP Price Prize lecture, Ohio State	2018
<i>Stars re-shaping galaxies</i> – Galactic angular momentum focus group, IAU, Vienna, Austria	2018
<i>Thermal conduction in superbubble evolution</i> – KSPA, CCA, NYC	2018
<i>What can Gaia do for white dwarfs?</i> – Lunch talk, CCA, NYC	2018
<i>The formation and hierarchical assembly of globular clusters</i> – Galaxy coffee, MPIA, Heidelberg	2018
<i>What do globular clusters tell us about the high-redshift universe?</i> – Galaxy lunch, Yale	2018
<i>How to fit a stellar spectrum</i> – GSPS, UC Berkeley	2018
<i>Gas kinematics from unresolved HI data</i> – Lunch talk, UC Berkeley	2018
<i>Globular cluster formation scenarios</i> – Near/Far workshop, Napa, CA	2017
<i>How to find long-period spectroscopic binaries</i> – Lunch talk, UC Berkeley	2017
<i>A self-consistent model for binary star spectra</i> – SFB seminar, ARI, Heidelberg	2017
<i>Effects of stellar feedback on dwarf galaxy evolution</i> – Galaxy coffee, MPIA, Heidelberg	2017
<i>Angular momentum of low-mass halos (poster)</i> – Galaxy-Halo Connection Workshop, KITP	2017
<i>Does the IMF vary in ultrafaint galaxies?</i> – GSPS, UC Berkeley	2017
<i>What regulates disk formation in low-mass galaxies?</i> – Lunch talk, UC Berkeley	2017
<i>Small-scale problems in <math>\Lambda</math>CDM: feedback to the rescue?</i> – GalForm seminar, UC Berkeley	2017
<i>Dust and the simulated SED</i> – Near/Far Workshop, Santa Rosa, CA	2016
<i>Dynamical modeling of low-mass galaxies</i> – Lunch talk, UC Berkeley	2016
<i>Can baryonic feedback save <math>\Lambda</math>CDM on small scales?</i> – undergraduate thesis talk, Yale	2016

## PUBLICATIONS (48 TOTAL; 18 FIRST AUTHOR; 750+ FIRST-AUTHOR CITATIONS)

h-index: 24 (all papers), 15 (first-author papers)

48. Santistevan, I., Wetzel, A., Sanderson, R., **El-Badry, K.**, Samuel, J., Faucher-Giguère, C.-A., “The origin of metal-poor stars on prograde disk orbits in FIRE simulations of Milky Way-mass galaxies”, MNRAS, submitted.
47. **El-Badry, K.**, Rix, H.-W., Heintz, T. M., 2021, “A million binaries from Gaia eDR3: sample selection and validation of Gaia parallax uncertainties”, arXiv:2101.05282, MNRAS, in press.
46. Martin, D. V., **El-Badry, K.**, Hodžić, V. K., Triaud, A. H. M. J., Angus, R., Birky, J., Foreman-Mackey,

- D., Hedges, C., Montet, B., Murphy, S. J., Santerne, A., Stassun, K. G., Stephan A. P., Wang, J., Benni, P., Krushinsky, V., Chazov, N., Mishevskiy, N., Ziegler, C., Soubkiou, A., Benkhaldoun, Z., Caldwell, D. A., Collins, K., Henze, C. E., Guerrero, N. M., Jenkins, J. M., Latham D. W., Levine, A., McDermott, S., Mullally, S. E., Ricker, G., Seager, S., Shporer, A., Vanderburg, A., Vanderspek, R., Winn, J. N., 2021, “TOI-1259Ab – a gas giant with 2.6% deep transits and a bound white dwarf companion”, arXiv:2101.02707, MNRAS, submitted.
45. Mercado, F. J., Bullock, J. S., Boylan-Kolchin, M., Moreno, J., Wetzel, A., **El-Badry, K.**, Graus, A. S., Fitts, A., Hopkins, P. F., Faucher-Giguère, C.-A., 2020, “Totally metal: A relationship between stellar metallicity gradients and galaxy age in dwarf galaxies”, arXiv:2009.01241, MNRAS, 501, 5121.
  44. Velázquez, J. F., Gurvich, A. B., Faucher-Giguère, C.-A., Bullock, J. S., Starkenburg, T. K., Moreno, J., Lazar, A., Mercado, F. J., Stern, J., Sparre, M., Hayward, C., Wetzel, A., **El-Badry, K.**, 2020 “The time-scales probed by star formation rate indicators for realistic, bursty star formation histories from the FIRE simulations”, arXiv:2008.08582, MNRAS, 501, 4812.
  43. Xiang, M.-S., Rix, H.-W., Ting, Y.-S., Zari, E., **El-Badry, K.**, Yuan, H.-B., Cui, W.-Y., 2020, “Data-driven spectroscopic estimates of absolute magnitude, distance, and binarity — method and catalog of 16,002 O- and B-type stars from LAMOST”, arXiv:2008.10637, ApJ, in press.
  42. Irrgang, A., Geier, S., Heber, U., Kupfer, T., **El-Badry, K.**, Bloemen, S., 2020, “A proto-helium white dwarf stripped by a substellar companion via common-envelope ejection: Uncovering the true nature of a candidate hypervelocity B-star”, arXiv:2007.03350, A&A, in press.
  41. Kamdar, H., Conroy, C., Ting, Y.-S., **El-Badry, K.**, 2020, “Spatial and kinematic clustering of stars in the Galactic disk”, arXiv:2007.10990, ApJ, submitted.
  40. Stern, J., Faucher-Giguère, C.-A., Fielding, D., Quataert, E., Hafen, Z., Gurvich, A. B., Ma, X., Byrne, L., **El-Badry, K.**, Anglès-Alcàzar, D., Chan, T.-K., Feldmann, R., Kereš, D., Wetzel, A., Murray, N., Hopkins, P. F., 2020, “Virialization of the inner CGM in the FIRE simulations and implications for galaxy discs, star formation and feedback”, arXiv: 2006.13976, ApJ, in press.
  39. **El-Badry, K.** and Quataert, E., 2020, “A stripped-companion origin for Be stars: clues from the putative black holes HR 6819 and LB-1”, arXiv:2006.11974, MNRAS, in press.
  38. Li, F., Rahman, M., Murray, N., Hafen, Z., Faucher-Giguère, C.-A., Stern, J., Hummels, C. B., Hopkins, P. F., **El-Badry, K.**, Kereš, D., 2020, “Probing the CGM of low-redshift dwarf galaxies using FIRE simulations”, arXiv:2010.13606, MNRAS, 500, 1038.
  37. Lazar, A., Bullock, J. S., Boylan-Kolchin, M., Chan, T.-K., Hopkins, P. F., Graus, A., Wetzel, A., **El-Badry, K.**, Wheeler, C., Straight, M. C., Kereš, D., Faucher-Giguère, C.-A., Fitts, A., Garrison-Kimmel, S., 2020, “A dark matter profile to model diverse feedback-induced core sizes of  $\Lambda$ CDM haloes”, arXiv:2004.10817, MNRAS, 497, 2393.
  36. Coronado, J., Rix, H.-W., Trick, W., **El-Badry, K.**, Rybizki, J., Xiang, M., 2020, “From birth associations to field stars: mapping the small-scale orbit distribution in the Galactic disc”, arXiv:2002.09496, MNRAS, 495, 4098.
  35. Santistevan, I. B., Wetzel, A., **El-Badry, K.**, Bland-Hawthorn, J., Boylan-Kolchin, M., Bailin, J., Faucher-Giguère, C.-A., Benincasa, S., 2020, “Growing pains: the formation times and building blocks of Milky Way-mass galaxies in the FIRE simulations”, arXiv:2001.03178, MNRAS, 497, 747.
  34. Pelliccia, D., Mobasher, B., Darvish, B., Lemaux, B. C., Lubin, L. M., Hirtenstein, J., Shen, L., Wu, P.-F., **El-Badry, K.**, Wetzel, A., Jones, T., 2020, “Effects of stellar feedback on stellar and gas kinematics of star-forming galaxies at  $0.6 < z < 1.0$ ”, arXiv:2001.00590, ApJL, 896, 26.
  33. **El-Badry, K.** and Quataert, E., 2019, “Not so fast: LB-1 is unlikely to contain a  $70 M_{\odot}$  black hole”, arXiv:1912.04185, MNRASL, 2020, 493, 22.
  32. Hafen, Z., Faucher-Giguère, C.-A., Anglès-Alcàzar, D., Stern, J., Kereš, D., Esmerian, C., Wetzel, A., **El-Badry, K.**, Chan, T.-K., Murray, N., 2019, “The fates of the circumgalactic medium in the FIRE simulations”, arXiv:1910.01123, MNRAS, 494, 3581.
  31. Tian, H.-J., **El-Badry, K.**, Rix, H.-W., Gould, A., 2019, “The separation distribution of ultrawide binaries across galactic populations”, arXiv:1909.04765, ApJS, 246, 4.

30. Hawkins, K., Lucey, M., Ting, Y.-S., Ji, A., Katzberg, D., Thompson, M., **El-Badry, K.**, Teske, J., Nelson, T., Carrillo, A., 2019, “Identical or fraternal twins?: The chemical homogeneity of wide binaries from *Gaia* DR2”, arXiv:1912.08895, MNRAS, 492, 1164.
29. **El-Badry, K.**, Rix, H.-W., Tian, H., Duchêne, G., Moe, M., 2019, “Discovery of an equal-mass “twin” binary population reaching 1000+ AU separations”, arXiv:1906.10128, MNRAS, 489, 5822.
28. Jahn, E. D., Sales, L. V., Wetzel, A., Boylan-Kolchin, M., Chan, T.K., **El-Badry, K.**, Lazar, A., Bullock, J. S., 2019, “Dark and luminous satellites of LMC-mass galaxies in the FIRE simulations”, MNRAS, 489, 5348.
27. Samuel, J., Wetzel, A., Tollerud, E., Garrison-Kimmel, S., Loebman, S., **El-Badry, K.**, Hopkins, P.F., Boylan-Kolchin, M., Faucher-Giguère, C.-A., Bullock, J., Benincasa, S., Bailin, J., 2019, “A profile in FIRE: resolving the radial distributions of satellite galaxies in the Local Group with simulations”, arXiv:1904.11508, MNRAS, 491, 1471
26. Garrison-Kimmel, S., Wetzel, A., Hopkins, P. F., Sanderson, R., **El-Badry, K.**, Graus, A., Chan, T.K., Feldmann, R., Boylan-Kolchin, M., Hayward, C., Bullock, J. S., Fitts, A., Samuel, J., Wheeler, C., Kereš, D., Faucher-Giguère, C.-A., 2019, “Star formation histories of dwarf galaxies in the FIRE simulations: dependence on mass and Local Group environment”, arXiv:1903.10515, MNRAS, 489, 4574.
25. **El-Badry, K.**, Ostriker, E. O., Kim, C.-G., Quataert, E., Weisz, D. R., 2019, “Evolution of supernovae-driven superbubbles with conduction and cooling”, arXiv:1902.09547, MNRAS, 490, 1961.
24. Dickey, C. M., Geha, M., Wetzel, A., **El-Badry, K.**, 2019, “AGN all the way down? AGN-like line ratios are common in the lowest-mass isolated quiescent galaxies”, arXiv:1902.01401, ApJ, 884, 180.
23. Emami, N., Siana, B., Weisz D. R., Johnson, B. D., Ma, X., **El-Badry, K.**, 2018, “A closer look at bursty star formation with  $L_{H\alpha}$  and  $L_{UV}$  distributions”, arXiv:1809.06380, ApJ, 881, 71.
22. Fitts, A., Boylan-Kolchin, M., Bozek, B., Bullock, J. S., Graus, A., Robles, V., Hopkins P. F., **El-Badry, K.**, Garrison-Kimmel, S., Faucher-Giguère, C.-A., Wetzel, A., Kereš, D., 2018, “Dwarf galaxies in CDM, WDM, and SIDM: disentangling baryons and dark matter physics”, arXiv: 1811.11791, MNRAS, 490, 962.
21. Hafen, Z., Faucher-Giguère, C.-A., Anglès-Alcázar, D., Stern, J., Kereš, D., Hummels, C., Esmerian, C., Garrison-Kimmel, S., **El-Badry, K.**, Wetzel, A., Chan, T. K., Hopkins, P. F., Murray, N., 2018, “The origins of the circumgalactic medium in the FIRE simulations”, arXiv:1811.11753, MNRAS, 488, 1.
20. Hirstenstein, J., Jones T., Wang, X., Wetzel, A., **El-Badry, K.**, Hoag, A., Treu, T., Bradač, M., Morishita, T., 2018, “The OSIRIS lens-amplified survey (OLAS) I: dynamical effects of stellar feedback in low mass galaxies at  $z \sim 2$ ”, arXiv:1811.11768, ApJ, 880, 54.
19. **El-Badry, K.**, 2019, “The geometric challenge of testing gravity with wide binaries”, arXiv:1810.13397, MNRAS, 482, 5018.
18. **El-Badry, K.** and Rix, H.-W., 2019, “The wide binary fraction of solar-type stars: emergence of metallicity dependence at  $a < 200$  AU”, arXiv:1809.06860, MNRASL, 482, 139.
17. **El-Badry, K.** and Rix, H.-W., 2018, “Imprints of white dwarf recoil in the separation distribution of Gaia wide binaries”, arXiv:1807.06011, MNRAS, 480, 4884.
16. Garrison-Kimmel, S., Hopkins, P. F., Wetzel, A., Bullock, J., Boylan-Kolchin, M., Kereš, D., Faucher-Giguère, C.-A., **El-Badry, K.**, Lamberts, A., Quataert, E., Sanderson R. E., 2018, “The Local Group on FIRE: Dwarf galaxy populations across a suite of hydrodynamic simulations”, arXiv:1806.04143, MNRAS, 487, 1380.
15. Debattista, V. P., Gonzalez O. A., Sanderson R. E., **El-Badry, K.**, Garrison-Kimmel, S., Wetzel, A., Faucher-Giguère, C.-A., Hopkins, P. F., 2018, “Formation, vertex deviation and age of the Milky Way’s bulge: input from a cosmological simulation with a late-forming bar”, arXiv:1805.12199, MNRAS, 485, 5073.
14. **El-Badry, K.**, Rix, H.-W., Weisz, D. R. 2018, “An empirical measurement of the initial-final mass relation with Gaia white dwarfs”, arXiv:1805.05849, ApJL, 860, 17.
13. **El-Badry, K.**, Quataert, E., Weisz, D. R., Choksi, N., Boylan-Kolchin, M. 2019, “The formation and hierarchical assembly of globular cluster populations”, arXiv:1805.03652, MNRAS, 482, 4528.
12. **El-Badry, K.**, Bland-Hawthorn, J., Wetzel, A., Quataert, E., Weisz, D. R., Boylan-Kolchin, M., Hopkins, P. F., Faucher-Giguère, C.-A., Kereš, D., Garrison-Kimmel, S. 2018, “Where are the most ancient stars in the Milky Way?”, arXiv:1804.00659, MNRAS, 480, 652.

11. Fitts, A., Boylan-Kolchin, M., Bullock, J., Weisz, D. R., **El-Badry, K.**, Wheeler, C., Faucher-Giguère, C.-A., Quataert, E., Hopkins, P. F., Kereš, D., Wetzel, A., 2018, “No assembly required: mergers are mostly irrelevant for the growth of low-mass dwarf galaxies”, arXiv:1801.06187, MNRAS, 479, 319.
10. **El-Badry, K.**, Bradford, J., Quataert, E., Geha, M., Boylan-Kolchin, M., Weisz, D. R., Wetzel, A., Hopkins, P. F., Chan, T. K., Fitts, A., Kereš, D., Faucher-Giguère, C.-A. 2018, “Gas kinematics in FIRE simulated galaxies compared to spatially unresolved HI observations”, arXiv:1801.03933, MNRAS, 477, 1536.
9. Garrison-Kimmel, S., Hopkins, P. F., Wetzel, A., **El-Badry, K.**, Sanderson R. E., Bullock, J., Ma, X., van de Voort, F., Hafen, Z., Faucher-Giguère, C.-A., Hayward, C. C., Quataert, E., Kereš, D., Boylan-Kolchin, M., 2018, “The origin of the diverse morphologies and kinematics of Milky Way-mass galaxies in the FIRE-2 simulations”, arXiv:1712.03966, MNRAS, 481, 4133.
8. Chan, T. K., Kereš, D., Wetzel, A., Hopkins, P. F., Faucher-Giguère, C.-A., **El-Badry, K.**, Garrison-Kimmel, S., Boylan-Kolchin, M. 2017, “The origin of ultra diffuse galaxies: stellar feedback and quenching”, arXiv:1711.04788, MNRAS, 478, 906.
7. **El-Badry, K.**, Ting, Y.-S., Rix, H.-W., Quataert, E., Weisz, D. R., Cargile, P., Conroy, C., Hogg, D. W., Bergemann, M., Liu, C., 2018, “Discovery and characterization of 3000+ main-sequence binaries from APOGEE spectra”, arXiv:1711.08793, MNRAS, 476, 528.
6. **El-Badry, K.**, Rix, H.-W., Ting, Y.-S., Weisz, D. R., Bergemann, M., Cargile, P., Conroy, C., Eilers, A.-C. 2018, “Signatures of unresolved binaries in stellar spectra: implications for spectral fitting”, arXiv:1709.03983, MNRAS, 473, 5043.
5. Hopkins, P. F., Wetzel, A., Kereš, D., Faucher-Giguère, C.-A., Quataert, E., Boylan-Kolchin, M., Murray, N; Hayward, C. C., **El-Badry, K.** 2017, “How to model supernovae in simulations of star and galaxy formation”, arXiv:1707.07010, MNRAS, 477, 1578.
4. **El-Badry, K.**, Quataert, E., Wetzel, A., Hopkins, P. F., Weisz, D. R., Chan, T. K., Fitts, A., Boylan-Kolchin, M., Kereš, D., Faucher-Giguère, C.-A., Garrison-Kimmel, S. 2018, “Gas kinematics, morphology, and angular momentum in the FIRE simulations”, arXiv:1705.10321, MNRAS, 473, 1930.
3. **El-Badry, K.**, Weisz, D. R., Quataert, E. 2017, “The statistical challenge of constraining the low-mass IMF in Local Group dwarf galaxies”, arXiv:1701.02347, MNRAS, 468, 319.
2. **El-Badry, K.**, Wetzel, A., Geha, M., Quataert, E., Hopkins, P. F., Kereš, D., Chan, T. K., Faucher-Giguère, C.-A. 2017, “When the Jeans do not fit: How stellar feedback drives stellar kinematics and complicates dynamical modeling in low-mass galaxies”, arXiv:1610.04232, ApJ, 835, 193.
1. **El-Badry, K.**, Wetzel, A., Geha, M., Hopkins, P. F., Kereš, D., Chan, T. K., Faucher-Giguère, C.-A. 2016, “Breathing FIRE: How stellar feedback drives radial migration, rapid size fluctuations, and population gradients in low-mass galaxies”, arXiv:1512.01235, ApJ, 820, 131.

## SKILLS

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Computer Languages	Python, C/C++, Fortran, Stan, SQL/ADQL, R, Mathematica, $\LaTeX$ , bash, git
Parallel Computing	MPI, OpenMP, Python multiprocessing
Machine Learning	PyTorch, TensorFlow
Other Software	GIZMO, Athena++, MUSIC, MESA, FSPS, GALFIT, TOPCAT, MS Paint <sup>TM</sup>
Language	German (fluent), Spanish (beginner)