Tao Ren

900 University Ave.
Department of Physics & Astronomy
University of California, Riverside, CA, 92521

Phone: +1 (951) 907-3449
Website: taoren.org
Email: tao.ren@email.ucr.edu

Research

Dark matter makes up 85% of the mass in the universe, but its identity remains largely unknown. My research has been focused on exploring the self-interacting nature of dark matter using stellar kinematical data from spiral and elliptical galaxies. Moreover, I work on novel signals of dark matter models with a light mediator in direct detection experiments and particle colliders.

I have analyzed rotation curve data for more than 130 spiral galaxies in the framework of self-interacting dark matter. The galactic rotation curves exhibit a great diversity, a big challenge for the prevailing cold dark matter model. My analysis shows that self-interacting dark matter can explain the observed diversity and provides an excellent fit to the rotation curve data.

I also work on stellar kinematics of elliptical galaxies. Since baryons dominate the central regions in these systems, they are ideal for testing unique correlation between the baryon and dark matter distributions predicted in the self-interacting dark matter model. I expect to submit two papers on spiral and elliptical galaxies in early 2018.

Dark matter models with a light mediator could lead to interesting signatures in direct detection experiments. If the mediator is much lighter than the dark matter particle, the event spectra is peaked towards low recoil energies. I am going to explore the possibility of resolving this feature in the current and future experiments.

Education

2014 – Present	Ph.D. in Physics (expected 2019), University of California, Riverside
	Advisor : Prof. Hai-Bo Yu
2010 – 2014	B.S. in Applied Physics, Hefei University of Technology

Employment

2014 – Present	Teaching Assistant, University of California, Riverside

Publication

Anna Kwa, Tao Ren, Manoj Kaplinghat, Hai-Bo Yu, *"Self-interacting Dark Matter and the 'Diversity Problem' in Galactic Rotation Curves"* (in preparation)

Jigang Hu, Tao Ren, Guanjun Wang, Weiqing Gao, Junxue Chen, Feng Gao, Hai Ming, *"Terminal interface effect in metal-dielectric multilayer"*, Proc. SPIE 9047, 2013 International Conference on Optical Instruments and Technology, doi: 10.1117/12.2037815

Awards and Honors

Outstanding Teaching Assistant Award, UC Riverside (2017)

Outstanding Teaching Assistant, UC Riverside (2016)

Anne Kernan Award for Outstanding Graduate Student, UC Riverside (2015)

Dean's Distinguished Fellowship, UC Riverside (2014)

Claire and William Band Theoretical Fellowship (declined), Washington State University (2014)

China National Scholarship, Ministry of Education, China (2012)

China National Scholarship, Ministry of Education, China (2011)

Excellent Freshman Scholarship, Hefei University of Technology (2010)

Talks

"Explaining Diverse Rotation Curves of Spiral Galaxies with Self-Interacting Dark Matter"
APS Division of Particles & Fields 2017, Fermilab, Chicago, IL (8/2017)
Phenomenology 2017 Symposium, University of Pittsburgh, Pittsburgh, PA (5/2017)

"Apply SIDM to Spirals"
SOCAL BSM 2017, Grad Student Gong Show, University of California, Riverside, CA (4/2017)

Teaching

	University of California, Riverside
Quarter	Teaching Assistant
2017 Fall	Introduction to Physics 41A (Mechanics)
2017 Spring	Introduction to Physics 41C (Optics and Quantum Mechanics)
2017 Winter	Introduction to Physics 41B (Thermodynamics and Electromagnetism)
2016 Fall	Introduction to Physics 41A (Mechanics)
2016 Summer	General Physics Discussion 002A
2016 Spring	General Physics Discussion 002A
2016 Winter	General Physics Laboratory 02LC
2015 Fall	General Physics Laboratory 02LA
2015 Spring	General Physics Laboratory 02LC
2015 Winter	General Physics Laboratory 02LB
2014 Fall	General Physics Laboratory 02LA