Name: Michele L. Silverstein (she/her/hers)

Code: 667

Home institution: University of Maryland, Baltimore County

Name of task: M Dwarf Flares Through Time (667.021)

Role in task: The focus of my research is on characterizing low-mass stars called M dwarfs and their exoplanets. The main way I support the stellar flares team at Goddard is by gathering archival data and deriving stellar fundamental properties to put our results in context. I derive stellar radius, luminosity, effective temperature, mass, and a model spectrum for calibration of TESS flare energies for stars of a variety of magnetic activity levels, masses, and ages. Refining these properties is key to a range of studies, including those led the flares team and exoplanet characterization efforts led by the Goddard TESS team.

I also study exoplanets orbiting M dwarfs at the fully convective boundary, identified as a gap in the HR diagram. These "gap stars" undergo unique luminosity changes spanning billions of years, and efforts to understanding their activity levels, flare properties, and exoplanet demographics are in their infancy. My first exploration of this topic was in the discovery of the LHS 1678 exoplanet system, comprised of three planets and a brown dwarf orbiting a gap star. My work on this system inspired me to perform a search for characteristic exoplanet properties using published systems, which have revealed hints of a trend in exoplanet radius. I also work with high school student Ian Urquhart to perform climate modeling. We are learning that gap star luminosity changes influence the habitable zone and exoplanet climate evolution.

Background: I was born and raised in New Jersey before attending college at Cornell University in Ithaca, New York. At first, I wanted to major in chemistry, physics, philosophy, and/or psychology. After taking a class in each, I realized my declared chemistry major wasn't the right fit - I was jealous of physics majors! I leapt into what struck me as a very intimidating major, ultimately choosing an astronomy concentration. At the end of my second year, I was told I would need three research experiences to get into graduate school. (This was probably not true!) I panicked a little but managed it with advice from other students and professors. I worked with Prof. Gordon Stacey and his team on an instrumentation project for two semesters, a transiting exoplanet project with Dr. Kevin Covey for one semester, and a circumstellar debris disk project one summer with Prof. Michal Simon at Stony Brook University. At Stony Brook, I met my current postdoctoral advisor, Dr. Joshua Schlieder, who was a PhD student with Prof. Simon at the time! Before graduate school, I was an intern at Goddard for a summer working on instrumentation with Dr. Negar Ehsan. For my masters and PhD, I attended Georgia State University, where I found a great community in the department and went through a lot of personal growth. I worked with Prof. Todd Henry and Dr. Wei-Chun Jao, focusing on observations using ground-based telescopes and fundamental properties of low-mass stars. In the next stage of my career, I also returned to exoplanets; I won a NASA Postdoctoral Program

Fellowship at Goddard to study stellar flares, stellar fundamental properties, and low-mass star exoplanets. With the end of the fellowship, I joined CRESST II in August 2022, and I've been privileged to be able to continue working on these topics ever since.

Favorite part of being a CRESST Scientist? I truly enjoy being part of a community. When I was applying to postdocs after graduate school, I explicitly chose places where I would be part of a collaboration. At Goddard, I have been privileged to join a team of people with a diversity of research and life experience. Many of us have lunch together a few times per week, and there are weekly and biweekly meetings where we talk science, help each other if we're stuck on a problem, and check in on how folks are generally doing. Being part of the team here has been very beneficial to my wellness as a human being and productivity as a scientist.

Recent Publications:
Quintana, Elisa V., et al. including M. L. Silverstein 2023, *Two Warm Super-Earths Transiting the Nearby M Dwarf TOI-2095,* arXiv e-prints, [arXiv:2304.09189](), Submitted to AAS Journals

Hord, Benjamin J., et al. including M. L. Silverstein 2022, *The Discovery of a Planetary Companion Interior to Hot Jupiter WASP-132,* AJ, 164, 13H, [2022AJ....164...13H]()

Silverstein, Michele L., et al. 2022, *The LHS 1678 System: Two Earth-Sized Transiting Planets and an Astrometric Companion Orbiting an M Dwarf Near the Convective Boundary at 20 pc,* AJ, 163, 151S, [2022AJ....163..151S]()

Paudel, Rishi R., et al. including M. L. Silverstein 2021, *Simultaneous Multiwavelength Flare Observations of EV Lacertae,* ApJ, 922, 31P, [2021ApJ...922...31P]()

List of awards won:
- SEEC Internal Scientist Funding Model Support FY-22 (2021)
- NASA Special Act Team Award x 2 (2021)
- NASA Postdoctoral Program Fellowship (2019)
- Sigma Xi Grant-in-Aid of Research (2016)
- Chambliss Astronomy Achievement Student Award (2016)

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Three fun facts:
(1) As a PhD student, I visited Chile 8 times for a cumulative 3 months of observing time (plus some vacation time to explore!). I operated the SMARTS/CTIO 0.9m telescope solo and in-person, an experience that is becoming increasingly rare.

(2) Often featured in my virtual meetings, my grey cat named Mystique loves food and my tortie cat named Kiera loves laps.

(3) I have a blue belt in taekwondo and been practicing various martial arts styles on and off since 2008. I attend the taekwondo club here at Goddard!