

Ilija Medan

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Education

Georgia State University

EXPECTED DOCTOR OF PHILOSOPHY IN ASTRONOMY

- Expected Graduation Date: May 2022/2023
- Advisor: Dr. Sébastien Lépine
- Research Focus: Astrometrics, Astrostatistics, Milky Way Structure and Evolution

Atlanta, GA, USA

May 2020 - PRESENT

Georgia State University

MASTERS IN PHYSICS

- Advisor: Dr. Sébastien Lépine

Atlanta, GA, USA

Aug. 2018 - Dec. 2020

Santa Clara University

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING WITH A MINOR IN PHYSICS

Santa Clara, CA, USA

Sep. 2012 - Dec. 2016

Skills

Proficient Python, LaTeX, bash scripting, DS9, SQL, ADQL

Familiar MATLAB, R, HTML, Julia, IRAF, C++

Research Experience

Georgia State University

GRADUATE RESEARCH ASSISTANT

- Cross-match ~6 million high proper motion sources from Gaia to six photometric surveys from various wavelength regimes using a newly developed Bayesian method. The resulting cross-match produces higher match percentages than the current Gaia archive cross-match catalogs, with the largest increase of 21% (Gaia archive) to 98% (new method) for Pan-STARRS within the survey footprint.
- Develop Bayesian methods to find high probability binary star systems where only the parallax of the primary star is known. This method has been validated for pairs with relatively small angular separations based on catalogs of known wide binaries, showing promise for the identification of previously undetected candidate binary systems.
- Calibrate a photometric metallicity relationship for K and early M dwarfs of $3500 < T_{\text{eff}} < 5280$ K using a Gaussian Process Regressor. The calibrated relationship is largely free of systematic errors, which were present in past works, due to the removal of unresolved binaries in the training sample using a newly developed iterative method.
- Advisor: Dr. Sébastien Lépine

Atlanta, GA, USA

Aug. 2018 - PRESENT

SOFIA Science Center

RESEARCH ASSISTANT

- Use polarized flux images from HAWC+ on SOFIA of the AGB carbon star IRC +10216 to derive the temperature profile in the circumstellar envelope via the radiative transfer modeling code DUSTY, that was optimized using differential evolution, allowing for the study of grain alignment mechanisms for carbon grains.
- Expand data analysis of Local Bubble project from the Summer of 2016 by adding all of the nearby field stars to the model of the local radiation field to show that the degree of polarization is largely insensitive to the radiation field from red field stars.
- Organize an observing run at the Wyoming Infrared Observatory (WIRO) to conduct a multi-band polarimetry study of the stellar contents around the Per OB3 association to probe the origins of the "Super Serkowski" effect.
- Provide guidance to an undergraduate summer research student who processed and analyzed data from the observations at WIRO.
- Advisor: Dr. B-G Andersson

Moffet Field, CA, USA

Jul. 2017 - Aug. 2018

Universities Space Research Association

STUDENT INTERN

- Write Python scripts to detect sources, calculate calibrated magnitudes and measure stellar proper motions from Hubble Space Telescope (HST) images of Kepler's Supernova Remnant from two epochs to search for the surviving companion of the supernova progenitor.
- Use the stellar catalog from the HST images to map the extinction in the direction of the remnant using an unsupervised machine learning Python module.
- Catalog the bright knots in the remnant, and calculate calibrated fluxes and surface brightnesses to track changes in morphology and intensity over the epoch.
- Advisor: Dr. Ravi Sankrit

Mountain View, CA, USA

Jan. 2017 - Jun. 2017

SOFIA Science Center

SUMMER RESEARCH STUDENT

Moffet Field, CA, USA

Jun. 2016 - Sep. 2016

- Support a large polarization survey by data mining archival photometric and spectroscopic data to study the effects of radiatively driven grain alignment in the Local Bubble.
- The above data was used to demonstrate that the degree of polarization in the wall of the Local Bubble was correlated with the radiation field that is dominated by the light from the OB associations within 200 pc of the Sun, which supports radiatively driven grain alignment.
- Advisor: Dr. B-G Andersson

Observing Experience

Hard Labor Creek Observatory

Hard Labor Creek State Park, GA,
USA

THREE NIGHTS OF OBSERVING WITH APOGEE CCD ON THE 24" MILLER TELESCOPE

February 2019

Lick Observatory

Mount Hamilton, CA, USA

THREE NIGHTS OF OBSERVING WITH THE KAST DUAL CHANNEL SPECTROGRAPH ON THE SHANE 3M TELESCOPE

May 2018

Wyoming Infrared Observatory

Laramie, WY, USA

TEN NIGHTS OF OBSERVING WITH THE OPTIPOL POLARIMETER ON WIRO'S 2.3M TELESCOPE

Nov. 2017

Awards

2019 **Scholarship**, La Serena School of Data Science: Applied Tools for Data-driven Sciences

La Serena, Chile

2018 **Recipient**, Georgia State University Second Century Initiative (2CI) Fellowship

Atlanta, GA, USA

2016 **Recipient**, Geoff and Josie Fox Summer Research Fellowship

Santa Clara, CA,
USA

Publications and Presentations

PUBLICATIONS

A Catalog of 531 White Dwarf Candidates in the Local Galactic Halo from *Gaia* Data Release 2

THE ASTROPHYSICAL JOURNAL

- Kim, Lépine & Medan (in press)

Magnetic Field Strengths and Variations in Grain Alignment in the Local Bubble Wall

THE ASTROPHYSICAL JOURNAL

- Medan & Andersson 2019, ApJ, 873, 87

PRESENTATIONS

Royal Astronomical Society Early Career Poster Exhibition

Virtual

POSTER PRESENTATION

Sep. 2020

- Poster presentation of improved photometric metallicity relationship for K/M dwarfs from APOGEE spectra.

SDSS-V Team Meeting

Virtual

POSTER PRESENTATION

Jun. 2020

- Poster presentation of improved photometric metallicity relationship for K/M dwarfs from APOGEE spectra.

235th AAS Meeting

Honolulu, HI, USA

POSTER PRESENTATION

Jan. 2020

- Poster presentation of Bayesian cross-matching of high proper motion stars in *Gaia*.
- Medan & Lépine 2020, Abstract 273.05, 235, AAS

Georgia State University Dunwoody Campus

Dunwoody GA, USA

GEORGIA STATE UNIVERSITY DUNWOODY CAMPUS ASTRONOMY CONFERENCE

October 2019

- Conference presentation to undergraduate physics and astronomy students on graduate research concerning cross-matching astronomical surveys.

University of California, Santa Cruz

Santa Cruz, CA, USA

INTERSTELLAR AND GALACTIC MEDIUM PROGRAM OF STUDIES (IMPS) SEMINAR

May 2018

- Seminar presentation of results of study on grain alignment in the wall of the Local Bubble.

231st AAS Meeting

Washington, DC, USA

POSTER PRESENTATION

Jan. 2018

- Poster presentation of results of study on grain alignment in the wall of the Local Bubble.
- Medan & Andersson 2018, Abstract 247.13, 231, AAS

230th AAS Meeting

Austin, TX, USA

POSTER PRESENTATION

Jun. 2017

- Poster presentation of results from data analysis of multi-epoch images of Kepler's SNR.
- Medan et al. 2017, Abstract 318.12, 230, AAS

Santa Clara University

Santa Clara, CA, USA

RESEARCH SYMPOSIUM

Nov. 2016

- Presentation of results from summer research project on grain alignment in the wall of the Local Bubble.

SOFIA Science Center

Moffet Field, CA, USA

SEMINAR

Aug. 2016

- Seminar presentation of results from summer research project on grain alignment in the wall of the Local Bubble.

Volunteer Work

Imagining The Future

Atlanta, GA, USA

VOLUNTEER SPEAKER

March 2020

- Spoke to a total of ~125 elementary school students throughout one day about distances to objects in the Solar System and how astronomers measure distances via. trigonometric parallax. This program was organized by the Atlanta Science Festival.

Georgia Outreach Team for Space (GOT Space)

Atlanta, GA, USA

VOLUNTEER SPEAKER

Jan. 2019 - PRESENT

- Speak with high school classes about various topics in astronomy. Participate in outreach events 2-3 times per semester.