

Curriculum Vitae

Chamani M. Gunasekera

Department of Physics & Astronomy
University of Kentucky
Lexington, KY 40506, USA

+1-612-469-6177
cmgunasekera@uky.edu
ORCID: 0000-0002-4634-5966

RESEARCH INTERESTS

Theoretical Astrophysics, Astrophysical Data Analysis and Numerical Simulations. In particular, understanding the underlying physics (from cosmic chemical evolution to details of radiative transfer) of hot gaseous environments from optical to X-ray and improving Cloudy (a spectral synthesis software that simulates conditions in gaseous nebulae).

EDUCATION

University of Kentucky (UK), Lexington, KY USA

PhD, Physics & Astronomy, December 2023

Advisors: Gary Ferland & Marios Chatzikos

Masters, Physics & Astronomy, December 2021

Advisors: Gary Ferland, Marios Chatzikos & Renbin Yan

College of Saint Benedict & Saint John's University (CSB/SJU), St Joseph, MN, USA

BA, Physics & Mathematics, May 2017

Advisors: Jim Crumley

RESEARCH EXPERIENCE

Graduate Research Assistantship, UK, Fall 2022 - present

Project: Resolve the one-electron fine-structure Lyman lines in Cloudy, in preparation for high-resolution X-ray data from XRISM.

Advisors: Gary Ferland & Marios Chatzikos

Graduate Research Assistantship, UK, Summer 2021 - Spring 2022

Project: Processing Chianti Database version 10.0.1, to be compatible with Cloudy.

Advisors: Gary Ferland & Marios Chatzikos

Graduate Research Assistantship, UK, Fall 2020 – Fall 2021

Project: Study of selective element depletions onto dust particles in the atmosphere of interstellar matter (particularly star-forming H II regions), and incorporating new post-depletion abundance calculations into Cloudy.

Advisors: Gary Ferland, Marios Chatzikos & Renbin Yan

Graduate Research Assistantship, UK, Spring 2019 - Fall 2020

Project Title: Analyzing source of Blazhko effect in RR Lyrae type variable stars. I utilized the MacAdam Observatory to obtain observations of Ru Pisces. This data was then processed and analyzed to look for period of pulsations, and any irregularities.

Advisor: Ronald Wilhelm

Summer Research for Undergraduates, CSB/SJU, Summer 2016 - Fall 2017

Project Title: Finding notable characteristics of solitary waves near Polar-Magnetopause crossing, using Polar, OMNI, ACE, and WIND satellite observations.

Advisor: Jim Crumley

TEACHING EXPERIENCE

Graduate Teaching Assistant, Department of Physics & Astronomy, UK,

Spring 2018 - Spring 2020

Responsibilities as Lab Teaching Assistant: instructing students through lab exercises and evaluating student work.

Responsibilities as Recitation Teaching Assistant: helping students understand material presented in lecture, holding office hours, and evaluating student work.

Summer Graduate Course Assistant, Department of Physics & Astronomy, UK, Summer 2019

Responsibilities as Lab Teaching Assistant: instructing students through lab exercises and evaluating student work.

Responsibilities as Recitation Teaching Assistant: helping students understand material presented in lecture, holding office hours, and evaluating student work.

Undergraduate Teaching Assistant, Department of Mathematics, CSB/SJU, Fall 2015 - Spring 2017

Responsibilities as Teaching Assistant: Evaluating student work and tutoring students at the Mathematics resource center.

**RESEARCH
PUBLICATIONS**

“The 2024 release of Cloudy”

Chatzikos, M., Gunasekera, C. M., Chakraborty, P., Shaw, G., van Hoof, P. A. M., Ferland, G. J. (In Preparation).

“H-, He-like recombination spectra – V: new H-like case B recombination-line emissivities for H and He”

F. Guzmán, Gunasekera, C. M., van Hoof, P. A. M., Chatzikos, M., Badnell, N. R., Ferland, G. (In Preparation).

“Resolving One-electron fine-structure Lyman lines II: Changes in the optical, UV, and X-ray spectra of ionized gas.”

Gunasekera, C. M., van Hoof, P. A. M., Chatzikos, M., Ferland, G. J. (In Preparation).

“Resolving One-electron fine-structure Lyman lines I: Preparing Cloudy for high-resolution X-ray in the microcalorimeter era.”

Gunasekera, C. M., van Hoof, P.A.M., Chatzikos, M., Ferland, G., (In Preparation).

“The 23.01 release of Cloudy”

Gunasekera, C. M., van Hoof, P. A. M., Chatzikos, M., Ferland, G. J. (2023). *RNAAS*, 7, 246. doi:10.3847/2515-5172/ad0e75

“The 2023 release of Cloudy”

Chatzikos, M., Bianchi, S., Camilloni, F., Chakraborty, P., Gunasekera, C. M., Guzmán, F., Milby, J. S., Sarkar, A., Shaw, G., van Hoof, P. A. M., Ferland, G. J., (2023). *RMxAA*, 59, 327. doi:10.22201/ia.01851101p.2023.59.02.12

“Self-consistent grain depletions and abundances II: Effects on strong-line diagnostics of extragalactic H II regions”

Gunasekera, C. M., Ji, X., Chatzikos, M., Yan, R., Ferland, G. J. (2023). *MNRAS*, 520, 4345. doi:10.1093/mnras/stad322

“Creating a CLOUDY Compatible Database with CHIANTI version 10 Data”

Gunasekera, C. M., Chatzikos, M., Yan, R., Ferland, G. J. (2022). *Astronomy*, 1, 255. doi:10.3390/astronomy1030015

“Self-consistent grain depletions and abundances I: The Orion Nebula as a test case”

Gunasekera, C. M., Ji, X., Chatzikos, M., Yan, R., Ferland, G. J. (2022). *MNRAS*, 512, 2310. doi:10.1093/mnras/stac022

RESEARCH TALKS & POSTER PRESENTATION 2023 - **Seminar** at the University of Wisconsin Madison Science Seminar, Madison WI
2023 - **Colloquium** at KAAS Kentucky Area Meeting, UK, Lexington KY
2022 - **iPoster** at 240th American Astronomical Society Meeting, Pasadena CA
2022 - **Colloquium** at Astronomy Seminar, UK, Lexington KY
2021 - **Colloquium** at Astronomy Seminar, UK, Lexington KY
2014 - **Poster** at Summer Research for Undergraduates, CSB/SJU, Collegetown MN

GRANTS SUPPORTED BY Spring 2021 - Fall 2023: NASA grant 19-ATP19-0188
Summer 2020 - Fall 2020: STScI (HST-AR-15018 and HST-GO-16196.003-A)

COMPUTER SKILLS **Languages:** C++, Python, IDL, L^AT_EX.
Applications: Vi/Vim, Git, Spyder, Jupyter, Visual Studio
Operating Systems: Unix, Linux, Mac OSX, Windows.

ADDITIONAL SKILLS Extensive experience in data reduction and visualization of massive simulation outputs.
Extensive experience in large database management.
Extensive experience in parallel computing and object oriented programming.
Extensive experience operating ground based telescope.
Experience in writing grant proposals.
Experience in leading a research collaboration.

OTHER Nominee for MacAdam Graduate Excellence Fellowship in Physics & Astronomy 2023, UK
Volunteer at Lexington Public Library Outreach Event "Full STEM Ahead: Solar Telescopes" 2023, Lexington KY
Nominee for MacAdam Graduate Excellence Fellowship in Physics & Astronomy 2022, UK

REFERENCES

Marios Chatzikos
mchatzikos@uky.edu
Department of Physics & Astronomy
University of Kentucky
+1-859-257-9169

Gary Ferland
gary@g.uky.edu
Department of Physics & Astronomy
University of Kentucky
+1-859-257-9169

Peter van Hoof
p.vanhoof@oma.be
Royal Observatory of Belgium
+32-2-373-6787

Ron Wilhelm
ron.wilhelm@uky.edu
Department of Physics & Astronomy
University of Kentucky
+1-859-257-6727