Cloudy Developers - available in Person

Gary Ferland

University of Kentucky

I work on the chemical evolution of the Universe, understanding how the spectrum forms, and using this spectrum to understand the Universe.

Maryam Dehghanian

University of Kentucky

My research focuses on active galactic nuclei (AGNs). I use both observations and theoretical modeling to study AGN structure, black hole mass, and the role of AGN-driven winds in galaxy evolution. I am currently a developer of the Cloudy spectral synthesis code, where I lead efforts to update and expand its atomic database for isoelectronic sequences.

Chamani M. Gunasekera

STScI

My primary research goal is to understand the underlying physics (from cosmic chemical evolution to details of radiative transfer) of hot gaseous environments from optical to X-ray. I study the chemical evolution, the details of radiative transport, and the microphysical processes in astrophysical gases. I am a collaborator of the CLOUDY, a spectral synthesis software that simulates conditions in gaseous nebulae. I work closely with Gary J. Ferland and Peter van Hoof. My research at STScI focuses on understanding dust extinction in collaboration with Karl D. Gordon and Marjorie Decleir.

Gargi Shaw

TIFR

My research interest is in astrophysics and specifically in Computational astrophysics (Quantitative spectroscopy), Photo dissociated region (PDR), and Quasar absorption lines, Novae, X-ray binaries, Astrochemistry, and Gender inequality in science education.

Cloudy Developers - Available via Zoom

Priyanka Chakraborty

Center for Astrophysics

Priyanka's research bridges two powerful realms of modern astrophysics – X-ray and infrared observations – harnessing multi-wavelength synergies to probe the Universe's most extreme phenomena and their impact on cosmic evolution. Meanwhile, James Webb Space Telescope (JWST) is unlocking transformative insights into the early Universe to uncover the origins, evolution, and chemical compositions of early galaxies. Beside observations, she is an expert in modeling collisionally-ionized and photoionized plasma, and has been an active developer of the spectral synthesis codes - AtomDB and Cloudy for several years.

Christophe Morisset

Instituto de Astronomia en Mexico

Dr. Christophe Morisset is a staff researcher at the Instituto de Astronomía of UNAM in Ensenada and a professor in UNAM's postgraduate Astrophysics program. He specializes in theoretical modeling of ionized nebulae to analyze their emission and determine their physical properties. A developer of widely used astrophysical tools such as **pyNeb** and **pyCloudy**, he has also led the creation of the **Mexican Million Models dataBase (3MdB)**, a large repository of photoionization and shock models. Dr. Morisset actively collaborates with international teams studying planetary nebulae, star-forming regions, and nearby galaxies through major surveys like CALIFA and SIGNALS.

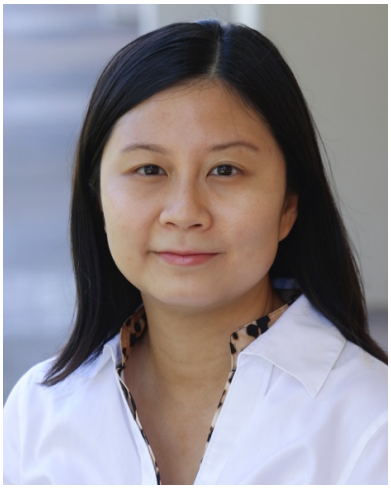
Peter Van Hoof

Royal Observatory of Belgium

Dr. van Hoof's research spans both observational and theoretical astrophysics, with a particular focus on the late stages of stellar evolution. His observational work investigates the evolution of intermediate-mass stars, especially post-AGB stars and planetary nebulae (PNe), as well as the formation of molecules and dust within these environments. He is also interested in photoionized regions and photodissociation regions (PDRs), along with stellar atmosphere modeling and elemental abundance determinations. On the theoretical side, Dr. van Hoof contributes to the development of the Cloudy photoionization code, using it to model emission from ionized gas and dust. His work also includes detailed modeling of dust processes such as the photoelectric effect and stochastic heating. He is actively involved in the refinement of atomic and molecular data, including transition probabilities, wavelengths, and energy levels, and contributes to astrochemical studies through molecular reaction networks and line data. His expertise bridges the gap between physical modeling and observational diagnostics, contributing significantly to our understanding of nebular environments.

Workshop Participants

I am Dirk Grupe and I am a Professor of Physics and the Chair of the Department of Physics, Geology, and Engineering Technology at Northern Kentucky University, just a few miles south of Cincinnati. I have been working on Active Galactic Nuclei for more than 30 some years, in particular Narrow Line Seyfert 1 galaxies. Especially I am interested in the UV and X-ray variability for which I primarily use the NASA Swift mission. I did attend the 2019 Cloudy workshop in Lexington, which was awesome. I am coming back to refresh to learn it. I would like to use Cloudy in the future to better understand why we are seeing correlations between the strength of the NLR [OIII] emission and the BLT FeII emission and why this is somehow linked to the X-ray properties of AGN.



I'm Marie Lau, a project scientist/lecturer at University of California, Riverside. My research focus is quasar/galaxy evolution, feeding, and feedback. I have worked on circumgalactic medium around quasars and dust-reddened quasars, and recently I've initiated a study of redshifted quasar-associated absorbers tracing inflowing gas. I'm interested in learning more about Cloudy modeling of absorbing gas clouds along the line-of-sight toward quasar-host galaxies. I'd also like to take this opportunity to greet my fellow AGN/ISM astronomers, build collaborations, and make friends.

My name is McKenna Leichty, and I am entering my second year of graduate school at Michigan State University. I'm currently working with Dr. Megan Donahue and other collaborators on an analysis of BCGs in the mid-infrared with data from JWST. I'm interested in using CLOUDY to generate models of their spectra, specifically looking at their rotationally-excited H2 and forbidden emission lines. Looking forward to meeting more astronomers interested in AGN and gas dynamics!

My name is Cole Panzer. I am a rising 3rd-year Ph.D. student at the University of Cincinnati, where I work with Prof. Matthew Bayliss. Up to now I have primarily been doing HST and Gemini data reductions. However, I will soon be working on the connection between spatially resolved LyC escape and the origins of strong nebular CIV emission. I hope to learn how to best utilize Cloudy to understand the conditions in which nebular CIV emission is produced. More broadly, our group uses strongly lensed sources to probe the epoch of reionization, chemical enrichment, and galaxy structure. I also find AGN and their properties fascinating and I'm additionally interested in ways to utilize AI, machine learning, and other technology/techniques in our research and data analysis.

My name is Jaylem Cheek. I am a rising third-year undergraduate student at Elon University, where I work with Dr. Chris Richardson on detecting intermediate-mass black holes. However, my main focus is the spin, accretion rates, radiative efficiency, and the evolution of these black holes over time, and how their luminosities change as a result of these factors. I would like to use Cloudy to develop a model where, given the properties of a specific black hole, one would be able to have an accurate prediction of the luminosity. In the future, I hope to use these predictions to help fund big X-ray projects such as AXIS, Lynx, Athena, and XRISM.

My name is Charles Reisner, and I'm a rising second-year graduate student at the University of Maryland. I work with Dr. Sylvain Veilleux on studying radio-mode feedback of low-redshift BCG's in the UV. My current objects of interest are NGC-1275 (the Perseus cluster) and the CenA cluster, both of which have very complex and interesting gas structures both directly from their outflows and in the CGM. I hope to use Cloudy in the future to better predict the ionization and metal abundances of these objects. I'm also always excited to meet more AGN/CGM people!

My name is Salem Wolsing and I recently graduated from Northern Kentucky University and I will be starting my Master's in October at the University of Goettingen. I have been working with Dr. Dirk Grupe on active galactic nuclei for over 4 years now. My work with Dr. Grupe has focused on analyzing individual AGN variability, correlating AGN parameters with X-ray variability, and analyzing changing look AGN. I'm interested in learning about how Cloudy can model AGN, especially changing look phenomena and the spectral changes that occur in changing look AGN. I look forward to meeting everyone.

My name is Zhuyun Zhuang. I recently completed my PhD in astronomy at Caltech and will be joining Northwestern University as a CIERA Fellow this fall. My research focuses on spatially resolved studies of low-mass star-forming galaxies using KCWI, with an emphasis on stellar populations and chemical enrichment. I'm looking forward to bridging the spatially resolved stellar and nebular perspectives by incorporating photoionization modeling with Cloudy, and I'm also interested in applying these methods to upcoming PFS datasets in the integrated-light regime.

My name is Zongnan Li, and I am now a postdoc fellow (the EACOA fellow) at the National Astronomical Observatory of Japan. I obtained my PhD at Nanjing University in China in 2022. My research focuses on the multiphase interstellar medium in nearby galaxies, in particular M31 and M81, to explore the imprint of AGN activities on the surrounding medium. I have used CLOUDY to test photoionization models in these well-constrained systems using high-resolution IFU data, and found that traditional photoionization mechanisms fail to explain the line emission in the central regions of the nearest low luminosity AGNs. I am looking forward to learning more about CLOUDY and seeking possible alternative mechanisms, for instance, cosmic rays, shocks, that may be responsible for the gas ionization in these environments.

I'm Jonathan Berkson, and I am a rising third-year undergrad at Elon University. At Elon I work in Dr. Chris Richardson's Intermediate-Mass Black Hole research group (along with Jaylem Cheek, who is also attending this workshop). My research, in particular, is focused on creating and updating the gas and dust physical and chemical simulations to implement a self-consistent prescription for gas and dust physics and chemistry to implement into CLOUDY. Furthermore, the following point of interest would be to find unique or interesting features of predicted IMBH spectra to better understand how to identify them using JWST, Hubble, and hopefully influence next-gen telescopes! I'm very excited to be attending this workshop and to meet everyone.

My name is Aleena Ebey, and I'm a rising 3rd-year PhD student at the University of Cincinnati. I have been doing research for about a year now, working with Dr. Matthew Bayliss on studying the Formation and Evolution of Gravitationally Lensed Galaxies. My research involves using JWST data. The collaboration I'm involved with, JWST-LEGGOS, focuses primarily on the large-scale gravitationally lensed galaxies at the Epoch of Reionization (EoR) and Cosmic Noon. My current project is Spatially Resolved Nebular Temperature and Density Maps of bright lensed galaxies using line ratios with OIII 4363 and Cloudy is a great tool for modeling how the strengths of various lines vary with T_e, n_e, metallicity, etc., for nebular temperatures and densities. My hope is to learn how I can utilize Cloudy for this purpose.

I’m Bruno Santos, a rising 2nd-year PhD student at the University of São Paulo (USP) in Brazil. For the past three years, I’ve been working with Dr. Marcos Perez Diaz in the Novae Group here at USP. My current project focuses on developing a PCA and AI-driven algorithm for rapid diagnostic of physical parameters in white dwarf-shell systems using spectroscopic data in large samples. This work is built on a model grid computed with the RAINY3D photoionization code, which relies on Cloudy as a subroutine for spectrum calculations.

My name is Lucas Kuhn, and I am an incoming third-year graduate student at the University of British Columbia in Canada. My research focuses on cool-core brightest cluster galaxies (BCGs) - some of the most massive and dynamic galaxies in the Universe - where star formation and feedback processes are particularly intense. I'm interested in using Cloudy to model and compare observations of these extreme systems, with the goal of disentangling the dominant sources of ionization and excitation driving their complex interstellar and circumgalactic environments.

I am Soumyadeep ('Sou' in soul + 'mia' in academia + 'deep'), a rising 3rd year graduate student at Caltech. My advisor is Shri Kulkarni, and I am working with him on studying the warm ionized medium through the fine structure emission lines, like that of [Ne II], which we are detecting with JWST. We aim to compare the observations to Cloudy models of WIM and infer properties like abundance and ionization parameter. I also work on other projects with collaborators, all of which can benefit from Cloudy. This includes modeling disks around white dwarfs (gaseous emission lines) and planetary nebulae. Looking forward to meeting everyone!

My name is Braden Draucek and I am going into my 6th year of grad school at Western Michigan University in Kalamazoo, MI working on my PhD under Dr. Manuel Bautista (now at DOE) and Dr. Kirk Korista. I am working on using machine learning and AI to fit AGN continua and analyze emission lines and I use CLOUDY regularly to compare fits with my templates I've coded. I am excited to learn more about the functionality of CLOUDY and how to get the most out of the models I run.

My name is Hannah Dykaar. I’m a new postdoc at McGill University. My research focuses on extragalactic transients, particularly tidal disruption events, which are sources that occur when a star is torn apart by the tidal forces from a supermassive black hole. Recently, I've become interested in using Cloudy to simulate the time-dependent emission lines from these sources.

I'm Bingjie Wang, and I'm starting a NASA Hubble Fellowship at Princeton as this workshop begins.

My research centers on developing rigorous methodologies to infer the physical properties of distant galaxies and AGNs. Lately, I've been focused on characterizing the population of compact, red sources known as ``little red dots" (LRDs) -- a discovery and a puzzle in the JWST era.

I began using Cloudy earlier this year to explore what constraints we might get from emission lines, even when the central engine is likely embedded in an extremely dense neutral hydrogen cloud (a paper on this is currently under collaboration review, but happy to chat!)

My name is Sarah Taft and I just finished my 4th year at the Minnesota Institute for Astrophysics (University of Minnesota, Twin Cities). I primarily focus on IR spectroscopy of stellar ejecta, specifically PMS binaries and classical novae, and I use CLOUDY to model the emission lines in these spectra and constrain chemical abundances.

Mason Huberty
I have just finished by 2nd year in the PhD program at the Minnesota Institute for Astrophysics, University of Minnesota, Twin Cities. I study galaxies at both high and low redshift, specifically in the context of the role galactic feedback plays on galaxy evolution and using galaxies to probe reionization. I am interested in using CLOUDY to better understand the ISM conditions in the early universe.

I am Mayank Sharma, a rising 4th year graduate student in the Department of Physics at Virginia Tech. My research primarily focuses on the observational signatures of Active Galactic Nuclei (AGN) outflows, both in absorption and emission. I make use of Cloudy models to interpret the physical conditions (e.g., temperature, ionization and density) of the outflowing gas that leads to the wide variety of observed spectroscopic features. Through them, I am interested in studying how the outflow properties evolve from parsec to kilo-parsec scales; with the main goal of understanding its impact on the evolution of the host galaxy.

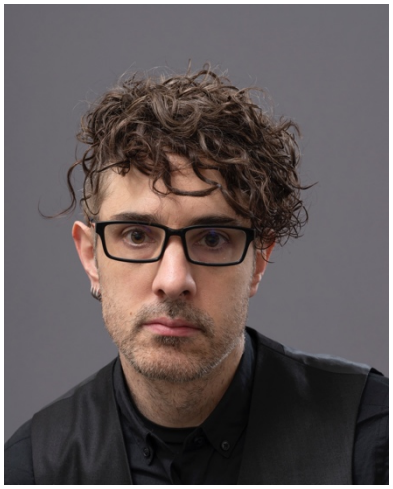
Eliat Glikman

I am Manoj Ghosh, a rising second-year grad student at Virginia Tech. My research focus is on quasar outflows and AGN feedback using absorption spectra. I use Cloudy to model photoionization in these environments, particularly to interpret observed spectra and derive physical conditions of the ionized gas. I'm looking forward to deepening my understanding of Cloudy. Excited to connect and exchange ideas!

I go by Beth. I am at Space Telescope Science Institute and also have an affiliation at Johns Hopkins University. I study mass loss from evolved stars and am interested in applications of Cloudy to modeling these stars' circumstellar environments.

My name is Catelin Smith, and I'm a rising junior at Johns Hopkins University. Currently, I'm doing research with Dr. Beth Sargent at STScI (who is also attending this workshop) to study the composition of dust around evolved stars, particularly oxygen-rich AGB stars. I'm looking to use CLOUDY to potentially study gases close to these stars, but I'm also interested in learning about its other applications. Looking forward to meeting you all!

My name is Jason Young, and I'm a research scientist at the SETI Institute. My work focuses on galaxy evolution, and I use cloudy to create spectral models to fit multi-instrument SEDs. I'm interested in meeting other CLOUDY users, and learning how to create the most effective models.



My name is Thomas Lai, and I’m a staff scientist at Caltech/IPAC, working in the IPAC Roman Team. My research primarily focuses on characterizing the ISM across different galaxy types, including star-forming galaxies, AGN, and dwarf galaxies. Recently, I’ve been using JWST spectroscopy to study dust features, particularly PAHs, in dwarf galaxies. I’m also actively involved in the development of MIR spectral decomposition tools. I’m excited to explore how CLOUDY can enhance our understanding of these rich infrared features.

I’m Qiaoya Wu, a fifth-year PhD student in Astronomy at the University of Illinois at Urbana-Champaign. My research focuses on quasar optical spectral analysis using large public surveys such as SDSS and DESI. I am particularly interested in modeling the physical conditions of line-emitting regions around AGNs, and I have been using CLOUDY under the locally optimally emitting cloud model to compute broad-line region emissivities.

I’m excited to attend this workshop to deepen my understanding of CLOUDY and explore how to better integrate photoionization predictions with large spectroscopic datasets. Looking forward to learning from and connecting with everyone!

I am Claudia Scarlata, from the Minnesota Institute for Astrophysics. I have always wanted to participate in this workshop, and I am looking forward to it!

I'm Prof. Chick Woodward a faculty member of the Minnesota Institute for Astrophysics whose research interests include the study of evolved stellar systems, classical novae, and recurrent novae both galactic and in nearby galaxies. Our team has been using Cloudy to model and interpret spectra of these objects using a variety of space-based (JWST, HST, Swift, Chandra, IUE), airborne (SOFIA, Kuiper), and ground-based observatories (LBTO, Gemini, ESO, NASA IRTF). I'm interested in getting some insight into the latest version of Cloudy (25.00_rc1), exploring more the multi-dimensional modelling aspects of Cloudy, and finding out how others are applying this tool in their astrophysical research.

My name is Ting-Hui Lee. I am an instructor at the Western Kentucky University. My research interest is on planetary nebulae. I have some optical spectra of compact PNe that were obtained with the Southern Astrophysical Research Telescope (SOAR). I would like to use CLOUDY to build photoionization models for them and also explore possible research projects for undergraduate students.

My name is Joshua Roberson - I just (as in two weeks ago just) finished my doctorate at the University of Cincinnati under Dr Matt Bayliss. My research thus far has focused on characterizing Epoch of Reionization and EoR analogue galaxies with SED modeling, and I'm looking to increase my knowledge of the nebular side of things with this workshop. My next project specifically is focusing on tracking reionization parameters using CIII] and OII] emission lines, and I hope to leave with a better understanding of how CLOUDY is modeling those lines for different galaxy parameter spaces.

I am Elias Kammoun, a postdoc in the high-energy astrophysics group at Caltech and member of the NuSTAR SOC. I study various aspects of active galactic nuclei: measuring black hole spins, studying continuum reverberation, understanding broad-line region properties across the EM spectrum, studying X-ray obscuration, as well as jet properties. In my studies, I employ a variety of techniques including observations and modeling, using spectral and timing analysis techniques, X-ray polarization, and more recently high-resolution X-ray spectroscopy. Recently, I am mainly studying the different facets of the X-ray and UV/optical connection in AGN.

My name is Frank Ning, and I have just finished my 1st year in the PhD program at the University of Minnesota, working with Professor Claudia Scarlata. I am broadly interested in reionization and various aspects of cosmology. Recently, I have been working on building an IFU data cube from the spectroscopic data of the Euclid space telescope. More relevant to this workshop, I have also been doing some simulations of the Lyman-alpha forest of unresolved extended sources, such as galaxies. For this, I am interested in using Cloudy to model the detailed physical processes in the IGM and the spectral lines they produce.

My name is Jiayi Sun. I have just joined the faculty at University of Kentucky after finishing my Hubble Fellowship at Princeton University. My research primarily use long-wavelength observations to study the multi-phase ISM in nearby galaxies. I would love to learn about CLOUDY’s functionalities and how it can help us model IR and mm line emissions from the molecular and ionized gas.

My name's Thunyapong Mahapol, but I go by "M." I'm a rising seventh-year PhD student at George Mason University. I work with my advisor, Dr Peter Becker, on developing theoretical models for X-ray Fourier time lags from AGN accretion disks. I'm looking forward to this workshop so I can learn how the observational data are analyzed using Cloudy as my work mostly focuses on solving equations, and I'm unfamiliar with obtaining observational data.