

What Regulates the Physical Conditions in the Galactic Center?

The large-scale properties of present-day galaxies are thought to result from physical processes which occur in their very centers – an evolutionary connection between the nucleus and its surroundings which may or may not continue today in our Milky Way. This project will investigate the mechanisms which drive the observed high densities, high temperatures and strong turbulence in the molecular gas in the center of our galaxy. Does the black hole or a starburst control these gas conditions, providing feedback to suppress star formation, or are these properties a consequence of gas migration to the center? **I will capitalize on the new capabilities of the Atacama Large Millimeter Array (ALMA) and the Karl G. Jansky Very Large Array (VLA) to answer these questions with the first high-resolution survey of the unique physical conditions in Galactic center gas.**

In collaboration with scientists at the National Radio Astronomy Observatory (NRAO) in Socorro and the New Mexico Institute of Mining and Technology (NMT), I will use the VLA to conduct a large-area, sub-parsec resolution survey of gas shocks and density in the Galactic center. The measured physical conditions – in conjunction with temperatures derived from complementary VLA and Green Bank Telescope studies – will be compared with predictions from both black-hole and stellar feedback models and models for bar shocks and tidal heating. These comprehensive comparisons will determine whether the inside-out process of feedback or the outside-in process of fueling gas to the center is responsible for the physical conditions in this region.

Finally, I will use ALMA for extremely high-resolution (~ 100 AU) follow-up of a subset of dense cores identified in the VLA survey. These observations will directly probe the density structure and kinematics in these potentially pre-starforming clumps to identify the processes that hinder star formation in this region. **Together, these observations will build a picture of the gas conditions in the Galactic center from on both large and small scales which will identify the physical mechanisms behind these unique conditions and the suppression of star formation, and complete our picture of the environment of this volatile region.**

Teaching Them to Fish: Organizing and Supporting Outreach for Educators

At NRAO and NMT, I will work with the NRAO Education Officer Judy Stanley to organize and develop existing programs to teach and support educators both locally and using internet resources. To begin with, I will help run and publicize workshops for local teachers to learn to use underutilized astronomy materials which NRAO and NMT offer on loan. I will also work to facilitate a program where NRAO scientists can discuss popular topics and answer questions via webconference with multiple classrooms around the country. As a part of this work, I will enhance NRAO's educational web presence and improve its interface with educators, describing and publicizing these programs as part of a standardized set of outreach activities which will be available for both local and national schools.

In my last year, I plan to use educator feedback from the programs of the previous two years – on which types of tools and activities teachers find most useful in their classrooms – to design and distribute an effective radio astronomy activity to complement those publicly available for astronomy at other wavelengths. The ultimate goal of my efforts will be to increase the effectiveness and sustainability of the NRAO education and outreach. By teaching K-12 educators about astronomy, giving them tools and materials which they both understand and are comfortable utilizing, and connecting them with scientists, this program will influence classrooms of children, year after year.