Synergistic Science in the Radio Regime
March 30, 2016 – the Carnegie Observatories

9:00am – 9:45am Breakfast
9:45am – 10:00am Introduction by Katey Alatalo (Carnegie)

10:00am – 10:40am Jackie Hodge (Leiden)
Shedding new light on high-z star formation
Studies of star formation in the distant universe have made substantial progress over the last decade. While the initial progress relied largely on deep fields in the rest-frame optical and UV, the advent of new radio/millimeter telescopes is allowing dramatic advances in our understanding of the molecular gas and dust-obscured star formation in the early universe. I will present recent progress and future prospects for such long-wavelength studies, which are shedding new light on high-z star formation.

10:40am – 11:20am Nienke van der Marel (IfA, Hawaii)
The ALMA revolution: gas and dust in planet-forming disks
The study of protoplanetary disks was for a long time based on indirect measurements of gas and dust, limiting our understanding of planet formation. The arrival of ALMA has revolutionized our view of the structure of these disks. The Early Science ALMA observations in the last few years have revealed rings, asymmetries, separation between gas and dust, gas dynamics, evidence for dust trapping and vortices, and many more exciting phenomena that have been predicted for decades in physical models of disks. In this talk I will review the most important ALMA discoveries and the next steps in planet formation studies.

11:20am – 12:00pm Coffee Break

12:00pm – 12:40pm James di Francesco (HiA, Victoria)
High and low-mass star formation in the era of ALMA
High-mass stars form within highly opaque, dense filaments in Giant Molecular Clouds (GMCs). To study the earliest phases of their formation, radio telescopes can pierce the thick veils of extinction where they form and reveal how these objects are coalescing out of their native environments. I will highlight my own experiences using single-dish and interferometer radio telescopes to probe the earliest phases of high-mass [and low-mass] star formation. Here’s a map of the Cygnus X we obtained at far-infrared/submm wavelengths with the Herschel Space Observatory highlighting the incredibly detailed and rich environment of this GMC.

12:40pm – 1:20pm Sabrina Stierwalt (NRAO, Charlottesville)
Dwarf galaxies as a lens to galaxy evolution and the high-redshift universe
Mergers at low redshift offer a high resolution look at a process that set the stage for galaxy assembly at earlier epochs when such events were more frequent. In particular, collisions between dwarf galaxies dominate the merger rate at all epochs. Radio and submillimeter observations probe the hidden lives of mergers from the dense gas fuel for star formation to shock heated gas from triggered starbursts and even dust obscured AGN at all galaxy mass scales.

1:20pm - 2:20pm Lunch Break, catered by Zankou Chicken

2:20pm – 3:00pm Jackie Villadsen (Caltech, NRAO, Charlottesville)
Stellar variability: tracing stellar storms with radio
Coronal mass ejections [CMEs] may drive extreme mass loss from exoplanet atmospheres exposed to active stars, but this facet of habitability [especially important for M dwarf planets] is poorly constrained because no CMEs have been detected outside of our solar system. I will present spectroscopic VLA observations of stellar radio bursts, which trace source velocities in the stellar corona, a method which offers the potential to detect CMEs on nearby stars. I will also describe the Starburst program, a new radio spectroscopy facility dedicated to monitoring space weather on nearby active M dwarfs.
3:00pm – 3:40pm  Vivian U (UC – Riverside)  
**Star formation laws in interacting galaxies**  
Luminous infrared galaxies in the local universe are mostly interacting pairs, where nuclear starburst and AGN activity are triggered by the inflow of gas and often obscured by dust at the center of these merging systems. High resolution multi-wavelength observations can probe the effect of gas dynamics on star formation and the interstellar medium at small scales. We need synergetic optical / near-infrared and radio observations of stars and gas to understand the role of gas-rich mergers in driving galaxy evolution.

3:40pm – 4:20pm  Coffee Break

4:20pm – 5:00pm  Peter Williams (CfA)  
**GRBs, planets and AGNs: things that go “bump” in the radio sky**  
Although the time domain has been an important part of radio astronomy since its early days (pulsars!), the digital computing and telecommunications revolution has greatly increased our ability to investigate this aspect of the radio sky. The objects that ”go bump” in the radio night range from planets to AGN to GRBs. I will describe how we search for radio-variable sources and what we can learn from them.

5:00pm – 5:40pm  Betsy Mills (NRAO, Socorro & U. Arizona)  
**Doing chemistry in the center of the galaxy**  
Centers of galaxies host massive stars, supernovae, star formation, and large reservoirs of gas, requiring a suite of observations to understand these regions. New ALMA observations of the center of our Galaxy complement studies at other wavelengths, placing the center of our galaxy into context with centers of other, yet-more extreme galaxies, and galaxies at high redshift.

5:40pm – 6:30pm  Summary of the day by Katey Alatalo, plus panel discussion