The invention of the magneto-optical trap (MOT) in 1987 - which was awarded the Noble Price in Physics 10 years later - has enabled many new and exciting experiments. Among them are precision measurements of basic atomic and collisional properties, Bose-Einstein Condensates and atom lasers, just to name a few. Recent developments in the field of atomic and molecular physics have included the creation of diatomic molecules, both consisting of the same (homonuclear) and of different (heteronuclear) atomic species. These ultracold molecules promise to revolutionize physical chemistry, few-body physics, precision measurements and quantum information processing, similar to how ultracold atoms revolutionized AMO physics several years ago.

I will discuss the workhorse in this field, the MOT, and present an outline of the research we are planning to do here at Willamette.