

Reproducing Space in the Laboratory

Our research involves looking at the processes that occur on the surfaces of dust grains and ice in space...

What do we use?

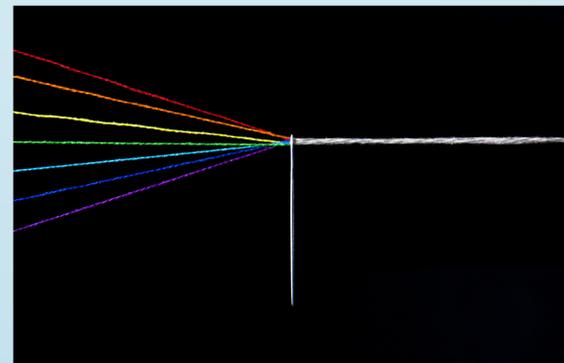
In order to mimic the conditions in these cold, dense dust clouds, we create models of dust grain surfaces and investigate them using special apparatus. We use:

- **'Ultra-high vacuum equipment'** to achieve low pressures.
- **'Helium refrigerators'** to cool our models down to -263°C .
- **'Synchrotron radiation sources, electron and ion beams'** to simulate the effect of starlight on ices.

What do we do?

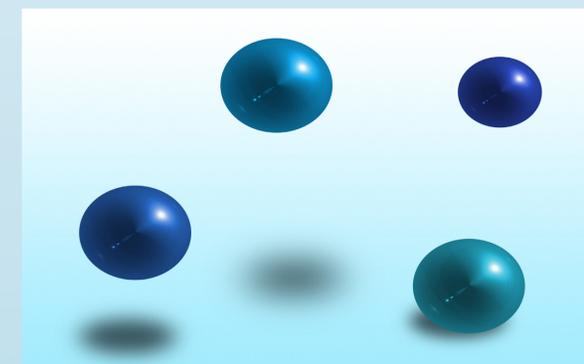
To find out what is happening on the surfaces of our model dust grains, we use a combination of two methods: **'Infrared (IR) Spectroscopy'** & **'Temperature programmed desorption'**.

IR Spectroscopy



The picture above shows a synchrotron light source hitting the surface of cotton. You can see the spectrum of colours bouncing off it. We bounce infrared light off the surface of model dust grains. When we do this, a small amount of light is absorbed by any molecules on the surface. The difference between the light hitting the surface and the light reflected gives us the spectrum of molecules present.

Temperature programmed desorption



We heat the dust grain surfaces and monitor the atoms and molecules released from the surface at different temperatures (using a 'mass spectrometer'). The temperature at which something comes off the surface shows us how strongly it is bound to that surface.