

# **QUB Low Energy Ion-Ices Irradiation Experiment**

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Dust grains are a very important component of the Interstellar Medium and it is believed that many complex molecules are formed on these grains. A new experimental setup has been developed at Queen's University Belfast to study the interaction of singly and doubly charged ions with ice analogues.

The experimental setup consists of an Electron Cyclotron Resonance ion source (ECR) attached to a "floating beamline" accelerator. The ECR ion source used in this experiment uses permanent magnets and 10 GHz microwave radiation for plasma heating. In order to produce large number of positively charged ions, the electrons from the plasma are accelerated by using high frequency electromagnetic fields, giving rise to electron impact ionisation within the plasma. This source is able of producing multiply charged ions. The beam analysis is achieved by using 90 degree banding magnets which select ions based on the mass to charge ratio. The ions are directed into an ultra-high vacuum chamber. The chamber is equipped with a rotatable cold-head capable of stable operation down to 10 K. A Quadrupole Mass Spectrometer is used for analysis.

The astrophysical ice analogue is deposited onto a temperature controlled sample holder attached to the cold-head. After the deposition the cold-head is rotated in such that the ice surface faces the beam. Beams of  $C^+$ ,  $C^{2+}$ ,  $O^+$ ,  $O^{2+}$ , are directed onto the target. Thermal programmed desorption studied and sputtering studies of water ice and oxygen ice have been studied.