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Raman Spectroscopy of Glacial Ice

Over the past several decades, humans have drilled ice core samples from places such as Greenland and Antarctica. While the information about the Earth's past climate gained from the ice and air bubbles in these cores is very valuable, it takes years to extract a single core, and each of these only represents a small portion of the ice beneath the surface. In order to gain more information from beneath the surface, Professor Joseph Talghader has been working on a project that would involve sending a device that can perform optical measurements down the bore holes left from taking the ice cores. One type of measurement that this device will be able to perform is Raman Spectroscopy, which involves focusing a laser at a particular location and measuring the wavelength of the light that is reflected back in order to determine what molecules exist at the area in question. Over the last several months I have been working on discovering what types of molecules it would be possible to find using such a device by observing ice samples that have already been extracted from Greenland. Artificial ice samples have also been used to determine what levels of certain molecules must be present before they can be observable above the background noise level of the Raman system. Before the Raman measurements could be taken it was necessary to create a cold stage capable of keeping the ice from melting while the data was gathered.

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