

Development of an Ice Crystal Video Spectrometer

Ann – please add some verbiage with dates, etc.

1. Significance of the Research

SPEC attempted to make measurements of ice crystal images and mass at their Storm Peak Facility in 2004 using a SPEC cloud particle imager (CPI) and the DRI snow video spectrometer (SVS). The CPI records photographic quality images of ice crystals and the SVS melts the ice crystals and measures the mass. The driving purpose of this research was to make simultaneous measurements of ice crystal images and mass to more accurately determine ice water content of the crystals. Based on research conducted at Storm Peak, SPEC determined that combining the CPI and SVS to make these measurements was an inadequate approach. Therefore, a decision was made to develop a new instrument, an Ice Crystal Video Spectrometer (ICVS), which combines the functions of both the CPI and SVS.

A functional drawing of the ICVS is shown in **Figure 1**. Photographs of the prototype taken during its development and testing stage in the laboratory are shown in **Figure 2**. An ice crystal falls through an electronically-controlled shutter at the top of the instrument and lands on a sapphire window. Two digital cameras, one positioned on-axis (like the CPI) and another positioned 75 degrees off-axis take several photographs of the ice crystal. Next the sapphire window is heated and the ice crystal is melted. The digital cameras then record the image of the water drop that is the residue of the melted ice crystal. Because two photographs are taken 75 degrees apart, the geometry of the water drop can be measured and the mass can be determined accurately.

SPEC anticipates deploying the ICVS at the Storm Peak research facility in the winter of 2004 - 2005.

**ICE CRYSTAL / LIQUID WATER CONTENT
IMAGING INSTRUMENT**

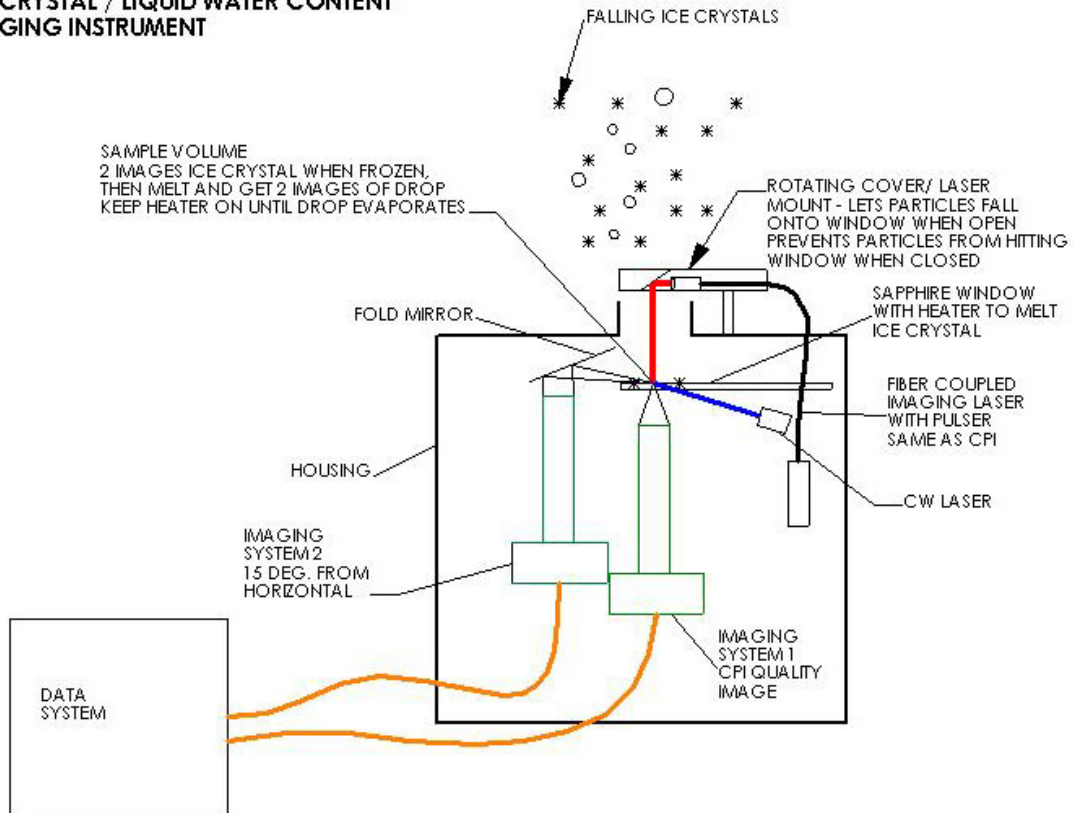


Figure 1. Functional drawing of the ICVS.

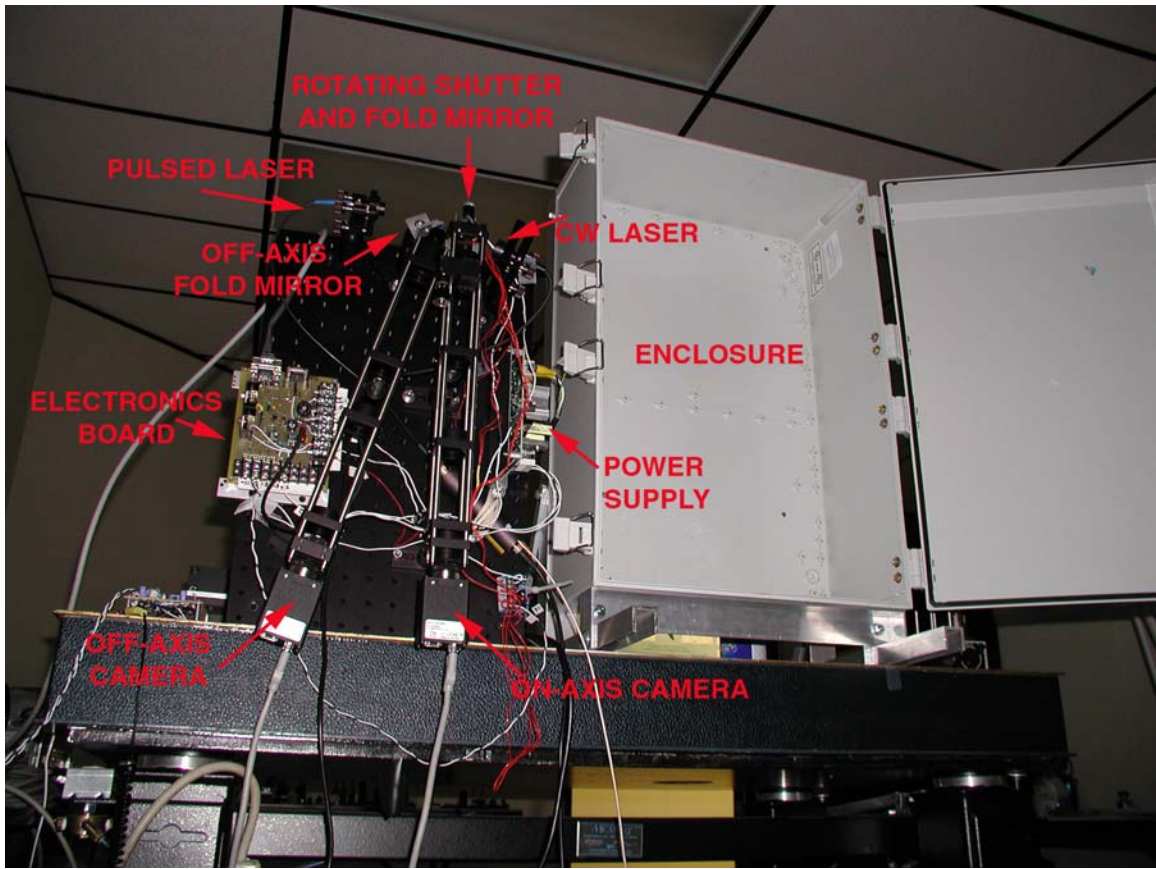


Figure 2. Photograph of ICVS during assembly