

## **W0105**

**Hardware-Software Solution for Accurate Crystal Recognition.** D. Toppani, BBRP, Lawrence Livermore Lab, Livermore, CA 94550.

A high-throughput crystallization facility has been established at LLNL as part of the TB structural genomics center project funded through the PSI. Our goal is to develop technologies that enable automated high-throughput crystallization. To help meet this goal, significant effort has been put into developing crystal recognition. Software has been developed using advanced edge detection and image processing techniques. Success rates were below 10% for false-positive and false-negative compared to human observation. However, performances were limited by image quality. A new imaging station was developed to overcome this issue, which dramatically improved image contrast, sharpness, resolution, signal-to-noise and depth of field. In addition, a special illumination system enables both bright-field and dark-field microscopy. Our dark-field imaging provides a new way to detect crystals, even at very small sizes. However, currently available labware produces artifacts in dark-field images, seriously impacting feature contrast and confounding crystal recognition. A labware prototype optimized for small volume crystallization and dark field imaging was developed and tested with success.

The combination of our new imaging station, new labware and image processing software, tightly integrated, will provide a robust solution for crystal recognition. Hardware and labware specifications and software recognition strategies will be described.