

Instrument Details

The PerkinElmer Caliper Life Sciences IVIS Spectrum (**Figure 1**) utilizes optical imaging technology to facilitate noninvasive longitudinal monitoring of disease progression, cell trafficking and gene expression in living animals. The IVIS Spectrum can quantitatively image the bioluminescence and/or fluorescence of both *in vivo* and *in vitro* experimental models. It is the only instrument that can image both the bioluminescence and fluorescence of animals in a high-throughput manner (can visualize between one cell on up to 5 mice at a single time). The combination of Spectrum's narrow excitation and emission band filters and spectral unmixing algorithms allows users to take advantage of a full range of reporters across the blue to near-infrared (NIR) wavelengths facilitating a reduction in autofluorescence and minimization of the cross-talk between reporters. The IVIS Spectrum is the ideal instrument for deep tissue, small animal imaging as it uses a 1" super-cooled (-90°C, ensuring low dark current and minimal noise) back-thinned, back illuminated, grade 1 CCD to provide high quantum efficiency over the entire visible to NIR spectrum and has a minimum detectable radiance of 70 photons/second/steradian/cm². This is the only platform that is calibrated to NIST traceable radiance standards that allows images measured in relative light units (or CCD camera counts) to be converted uniformly into surface radiance photons/second/steradian/cm² physical units. This absolute calibration enables researchers to accurately compare data with collaborators from other institutions.

One of the unique aspects of the Spectrum is its transillumination feature. This feature allows the acquisition of images at multiple transillumination points to scan the source intensity. The source is then reconstructed using developed algorithms to get a signal location, 3D visualization and quantitation. In combination with surface topography scanning, the reconstruction can then be co-registered with a digital organ atlas (can do immediately) or scans from other imaging devices such as μ CT and MRI scanners (which we plan to add to the imaging core in the future). This will provide an exact anatomical reference, essential for following aspects of disease progression such as tumor shape and metastasis. Thus, a major advantage of this IVIS system is that it seamlessly provides an anatomical/spatial resolution.



Figure 1. Proposed Imaging Equipment for New Imaging Core. The IVIS Spectrum system from Caliper Life Sciences enables 3D live-animal optical imaging. Images generated from here will then be further processed by UH's cadre of computational image analysis researchers.