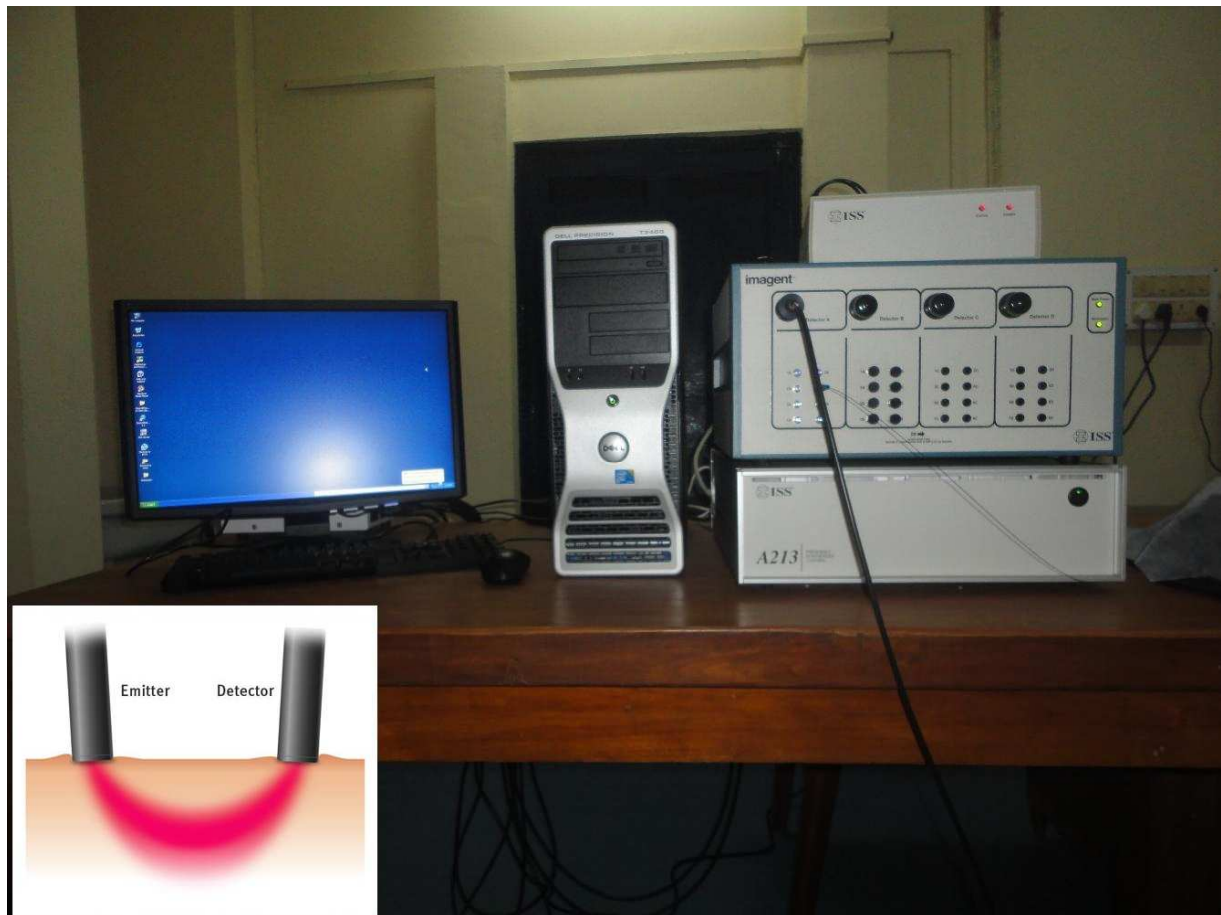


INSTRUMENT FOR DIFFUSE LIGHT MEASUREMENTS : ISS IMAGENT



This instrument, Imagent manufactured by ISS*, is used to detect diffuse light to characterize random media. Its working principle is based on the use of near infrared light for probing random media such as tissue, brain activities through the cortical surfaces, etc. The light passing through tissue is either absorbed or scattered. In the near infrared region (650-950 nm wavelength), a measurable amount of light can pass through due to the reduced absorption associated with hemoglobin and water, thus making the photon propagation dominantly scattering/diffusive.

Light from modulated sources is carried through optical fibers and the scattered light is measured via optical fiber bundle with a photomultiplier tube (PMT) detector. Such measurement can be used to obtain clinically important information of the tissue such as the absorption and scattering coefficients and the hemoglobin concentrations. A data acquisition program called Boxy is available, which measures and records frequency-domain measurement parameters (AC, DC, Phase) as a function of light source number and time. In order to calculate the value of the absorption and scattering

coefficients and hemoglobin concentration from the recorded data set, user may include his/her own choice of User Calculation Libraries (user written dynamic link libraries).

The system does not create tomographic image of the random media. We are developing algorithms to undertake diffuse light tomography of random media.

INSTRUMENT SPECIFICATIONS :

- Modulation frequency 110 to 300 MHz.
- Eight laser-diode sources, four of wavelength 690nm and another four of 830nm.
- Two photomultiplier tube (PMT) based detectors.
- Light source optical power is about 1mW average.
- The PMTs are sensitive to pW power levels.
- Multiplexing scheme: detectors time shared by turning sources on and off in fast cycles.
- All fiber-optic coupled
Light source fibers – 400 micrometers core.
Light detectors fiber – 3 mm diameter bundle.

IT CAN BE USED TO MEASURE :

- Absolute absorption coefficient and reduced scattering coefficient at two wavelengths (690nm and 830nm).
- Absolute oxygenated [HbO] and deoxygenated [Hb] hemoglobin concentrations.
- Total hemoglobin concentration, $THC = [HbO] + [Hb]$.

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*<http://www.iss.com>