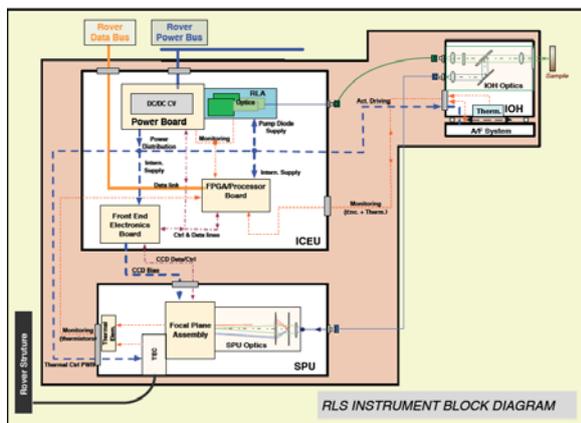


**RLS Instrument Radiometric Model: Instrument performance theoretical evaluation and experimental checks.** G. Ramos<sup>1</sup>, A. Moral<sup>2</sup>, J. A. Rodríguez<sup>2</sup>, C. Pérez<sup>2</sup>, C. Díaz<sup>2</sup>, I. Hutchinson<sup>3</sup>, R. Ingley<sup>3</sup>, F. Rull<sup>4</sup>, and E. Díaz<sup>5</sup>, <sup>1</sup>Instituto Nacional de Técnica Aeroespacial (INTA), Crtra. Ajalvir, km 4, 28850 Torrejón de Ardoz (SPAIN), [ramoszg@inta.es](mailto:ramoszg@inta.es), <sup>2</sup>Instituto Nacional de Técnica Aeroespacial (INTA), Crtra. Ajalvir, km 4, 28850 Torrejón de Ardoz (SPAIN), <sup>3</sup>Space Research Centre, Department of Physics & Astronom, University of Leicester, Michael Atiyah Building, University Road, Leicester, LE1 7RH (United Kingdom), <sup>4</sup>UVa-CSIC (CAB), Av. Francisco Valles, 8, Parque Tecnológico de Boecillo, Parcela 203, E-47151 Boecillo, Valladolid (SPAIN), <sup>5</sup>CAB/INTA – CISC, Crtra. Ajalvir, km 4, 28850 Torrejón de Ardoz (SPAIN).

**Abstract:** Raman Laser Spectrometer (RLS) is one of the Pasteur payload instruments located at the Rover of the ExoMars mission and within the ESA's Aurora Exploration Programme. RLS will explore the Mars surface composition through the Raman spectroscopy technique [1]. The instrument is divided into several units: a laser for Raman emission stimulation, an internal optical head (iOH) for sample excitation and for Raman emission recovering, a spectrometer with a CCD [2] located at its output (SPU), the optical harness (OH) for the units connection, from the laser to the excitation path of the iOH and from the iOH reception path to the spectrometer, and the corresponding electronics for the CCD operation (Figure 1) [3].



**Figure 1. RLS Instrument Block Diagram**

Due to the variability of the samples to be analyzed on Mars, a radiometry prediction for the instrument performance results to be of the critical importance. In such a framework, and taking into account the SNR (signal to noise ratio) required for the achievement of successful results from the scientific point of view (a proper information about the Mars surface composition), a radiometric model has been developed to provide the requirements for the different units, i.e. the laser irradiance, the iOH, OH, and SPU throughputs, and the samples that will be possible to be analyzed in terms of its Raman emission and the relationship of the Raman signal with respect to fluorescence emission, among others [4].

The radiometric model fundamentals (calculations and approximations), as well as the first results obtained during the bread board characterization campaign are here reported on.

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