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## Target and Dump Proton Beam Imaging Systems CDR RAMI and risk analysis

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## 1.        **SCOPE**

This document gives an overview of identified risks and their mitigation strategies. The main risk information is provided a spread sheet form, for clarity.

## 2.        **INTRODUCTION**

Please see the attached spread sheet, ESS-0149762b. The spread sheet template has been provided by courtesy of CEA. The quantification of the risks provided in the spread sheet should at his stage by considered as best guesses, based on incomplete information.

A few other general RAMI considerations :

### **Reliability and availability :**

The target systems : once commissioned the reliability and availability will mainly depend on how well the components withstand the combined proton beam and neutron flux radiation environment. This has been discussed in the various risks related to the photon source.

The dump system : concerning the optical components, the radiation environment will be less severe than for the target systems. However, since the camera is planned to be installed in the tunnel, the survival of electronics inside the dump tunnel is a key concern.

### **Maintainability :**

The target systems optical components cannot be accessed without pulling out the optical block and eventual slice from the plug. This is not expected to be done on a frequency basis during commissioning. On the other hand, the camera and all auxiliary electronics, including filters and spectrometers will be accessible during beam-on (placed in the A2T access area). The system will be designed to be able to do "as much as possible" in the A2T access area (varying filters is one example).

For the dump system, the camera electronics will not be accessible during "beam on". Auxiliary equipment, like filters, must therefore be remotely controllable, located in the radiation environment.

### **Inspectability :**

An illumination system, for example shining laser light into the optical system from the A2T access area, will be installed and can be used to frequently verify the integrity of the target optical systems.

A few other RAMI considerations, including accessibility and maintainability during the commissioning of the system without beam, are discussed in [ESS-0153500].

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