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Development of direct on-line temperature measurements of ISAC targets at TRIUMF

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Target temperature plays a crucial role in the performance of an ISOL target. At TRIUMF an optical technique has been developed and implemented on-line for direct temperature measurements simultaneous with beam heating. In this setup the light emitted by a hot target through the ionizer opening is collected via a set of optics and coupled into a spectrometer [1]. The method uses a spectrometer equipped with a near infrared (NIR) diffraction grating and a Hamamatsu InGaAs detector that allows continuous visualization of near-blackbody emission spectra representative of the target temperature. The spectrometer and its custom collection optics are calibrated using a Thorlabs Stabilized Tungsten-Halogen calibration source and the sample temperature is determined from fitting the recorded thermal spectrum using Planck's law and an emissivity model. The paper will report the method, the hardware and the test results correlating the measured target temperature with thermal simulation results and isotope release ratios measured at the yield station[2].

1. A.S. Tanskanen, et. al, NIM B, 463 248-250 (2020)
2. Kunz, P., et. al., Rev. Sci. Inst. 85, 053305 (2014)

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