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The EUSO-SPB2 mission LAWRENCE WIENCKE, Colorado School of Mines — The highest energy cosmic rays and PeV astrophysical neutrinos are tantalizing multi-messengers from some of the most extreme energetic environments in the Universe. As a precursor for the Probe of Extreme Multi-Messenger Astrophysics (POEMMA), the Extreme Universe Space Observatory on a Super Pressure Balloon II (EUSO-SPB2) will use the calorimetric properties of atmosphere to target Ultra High Energy Cosmic Rays and search for signatures of astrophysical tau-neutrinos using the earth skimming technique. The EUSO-SPB2 science payload features an air Cherenkov telescope (CT) and a UV fluorescence telescope (FT) each with 1 m diameter entrance pupils and Schmidt optics. With vantage points from the sub-orbital altitude of 33 km, EUSO-SPB2 will record EeV cosmic rays by looking down with the FT and also search for bright upward-going flashes from the dark ocean. The CT will look slightly below the Earth's limb to search for tau decay signatures and measure background signatures. Operation in an astrophysical target of opportunity mode is also planned. The first direct Cherenkov measurements of air showers from near space is also planned by looking slightly above the limb with the CT. The launch is planned from Wanaka NZ in 2023.

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