

# **Fine Resolution Epithermal Neutron Detector (FRIEND) onboard TGO. First results from cruise, elliptical capture orbit and science mapping phase**

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## **Abstract**

ExoMars is a two-launch mission undertaken by Roscosmos and European Space Agency. Trace Gas Orbiter, a satellite part of the 2016 launch carries the Fine Resolution Epithermal Neutron Detector instrument as part of its payload. The instrument aims at mapping hydrogen content in the upper meter of Martian soil with high spatial resolution of up to 60 km diameter spot. The instrument's neutron collimator, the first of its kind to map Martian neutrons flux, explains this capability.

Since launch in March 2016, FRIEND operated in three major mission phases: cruise to Mars, between April and September 2016, Mars Capture Orbit, between November 2016 and March 2017, and Science Orbit, from April 2018 up until now.

We will present our measurements' results from all three phases mentioned above. Cruise data provides for measurements of galactic cosmic rays in Earth-Mars transfer, an important input for future Martian missions planning. Data from the elliptical Mars Capture Orbit are an important step in instrument calibration needed for interpretation of routine measurements. Science orbit measurements are the first glance on Martian neutrons, and hence, hydrogen content at a high resolution.