T-REX instrument Project: Report of activities for the STAP meeting in October 2021.

INSTRUMENT PROJECT OVERVIEW

The T-REX instrument project is a collaboration between the German JCNS (75%) and the Italian CNR (25%), with a total agreed value of 16.85 M€. The project passed officially TG2 in August 2017. The Technical Annex has been signed and endorsed in January 2020.
The project of T-REX is expected to achieve completion (TG5) in June 2025. The access dates to ESS buildings for installation are foreseen for the end of 2022 in building E01 (first access) and in 2023 for the bunker area.

The agreed scope includes the delivery of a world class DGCS, capable to perform INS experiments for a broad user community spanning from magnetism to functional materials and functional soft matter, including the option of using polarized neutron for x-y-z neutron spin analysis. In the first-day, T-REX will be equipped with about 40% of detector area, equivalent to 0.8 sr. The instrument specific SE will be a dedicated cryostat.

Here we provide a brief overview of the progress made in Q2-2021 and Q3-2021, for the next STAP meeting in October 2021.

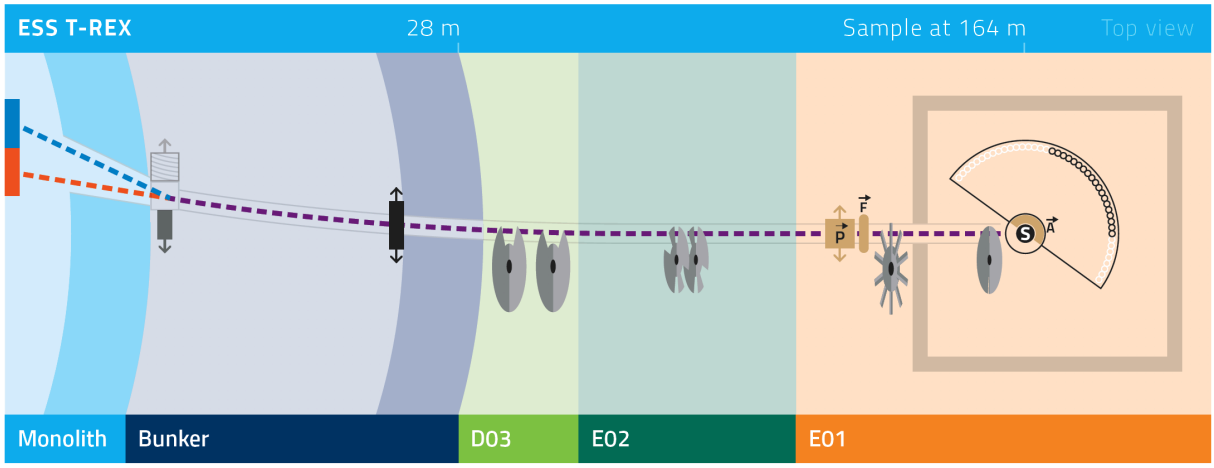
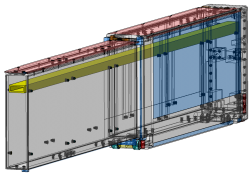
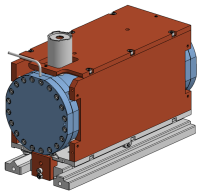
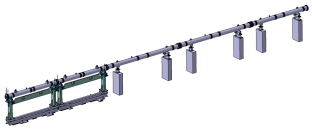
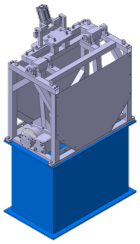
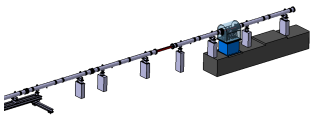
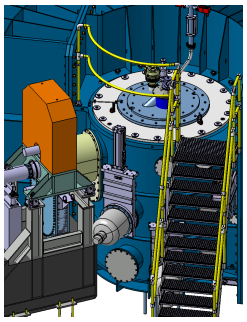
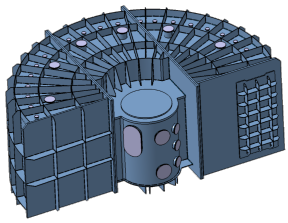
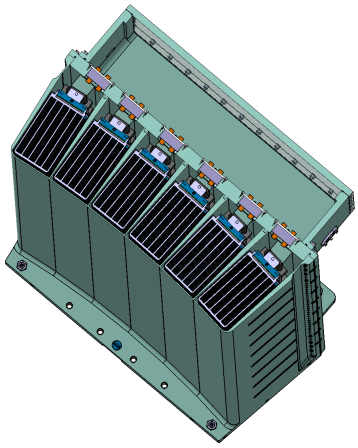


Figure 1. T-REX layout overview.

In-Bunker components

	The **NBOA** is currently in production @ S-DH, the FAT is expected to be completed in Oct 2021 and the delivery to ESS by end of 2021.
	The **BBGOA**'s CTV is approved. Technical discussions are ongoing with suppliers to find a proper solution to the challenge to fit cold neutron extractor and thermal guide in the ESS standard vacuum vessel. Aim to publish the call for tender in Q4 2021.
	**In-bunker guide and bunker wall feedthrough:** The CTV is approved, and the tender was awarded to S-DH. The Kick off Meeting is scheduled for Oct 2021. Delivery to ESS and installation planned for May 2023
	**Heavy Shutter:** Engineering design under development @ CNR. The current design is based on the Test Beamline Heavy Shutter. The IDR is planned for Q2 2022. Installation at ESS foreseen for May 2023.

Out-of-Bunker components

	Out-of bunker **neutron guide:** The CTV has been approved and the documentation to start the procurement is in preparation, with the aim to publish the call for tender by end of October 2021. The delivery and installation is envisaged in two packages: Jan 2024 and Dec 2024.
	**Pulse shaping and monochromating chopper:** The CTV is approved. Development and manufacturing will be conducted at Juelich (ZEA-1), after completion of the internal procurement, which is planned for Oct 2021. FAT scheduled for Oct 2024.
	**Detector Vessel**: Design Accepted (Sub-TG3.1) after development, calculations, simulations were conducted at FZJ. The first German-wide call for tender failed due to formal error by supplier in Sep 2020. Aim to rerun it as European call for tender in Oct 2021. There is a significant increase of material prices. Most likely the suppliers will not guarantee permeability requirements, so we performed test together with the ESS to evaluate the effects of material deformations on permeability. The ESS also conducted simulations to validate the choice of materials.
	**Neutron Detector Prototype:** The Detector development is conducted by the ESS. The housing design has been developed at FZJ to enable the largest possible detector surface area by keeping small gaps. The prototype design has been accepted and the call for tender is planned for Oct 2021 and the delivery in Sep 2022. The manufacturing is challenging, because the final contour must be manufactured from a large solid ingot and the machining will realize very thin wall thicknesses.