
Contribution ID: **9** Type: **Invited**

# Integration and first operation of the Gotthard-II detector at the European XFEL

*Wednesday, 15 March 2023 09:30 (30 minutes)*

Gotthard-II (G-II) is a silicon microstrip hybrid detector developed by Paul Scherrer Institut (PSI) within the framework of a collaboration agreement with the European XFEL (EuXFEL).

The G-II ASIC features a dynamic gain switching (DGS) architecture to cope with the requirements of the single photon sensitivity as well as the large dynamic range at the EuXFEL. In addition, it includes a 12-bit Analog-to-Digital Converter with a sampling/conversion rate of more than 18 MS/s, and a Static Random-Access Memory1 with a depth of 2700 images for temporal on-chip storage in order to match the unique accelerator pulse structure: up to 2700 pulses at 4.5 MHz within one EuXFEL pulse train are generated in a burst2.
Two different sensor designs, with a strip pitch of either 50 μm or 25 μm for a total of 1280 or 2560 output channels, are used in the final detector system. These sensors are able to provide a spectral sensitivity allowing either X-ray detection (optimized in the 5 keV –20 keV range) or visible light detection.

Its exceptionally good compliance with the EuXFEL beam conditions will make G-II the most widely employed detector across the facility with a total of 29 modules of different flavors installed in several scientific instruments and beam diagnostic setups.

Its usage predominantly in spectroscopic measurement will have a variety of applications, including diffraction/emission/absorption measurements, pulse arrival monitoring (of fundamental importance for pump-and-probe experiments), and beam quality monitoring with the possibility for the detector to generate a veto pattern for the large area pixel detectors such as AGIPD, LPD and DSSC.

In this paper, an overview of this detector technology and its usage at the EuXFEL will be presented; then, detector integration in the EuXFEL control, data acquisition and data correction infrastructure will be described, highlighting its challenges. Finally, an overview of the first results obtained with the EuXFEL beam will be given.

**Primary author:** RAMILLI, Marco (European XFEL)

**Co-authors:** Mr AHMED, Karim (European XFEL); Mr HAMMER, David (European XFEL); LOPEZ-CUENCA, Carlos (Paul Scherrer Institut); FERNANDES, Bruno (European XFEL); MEZZA, Davide (Paul Scherrer Institut); MOZZANICA, Aldo (Paul Scherrer Institut); PARENTI, Andrea (European XFEL); SCHMIDT, Philipp (European XFEL); SCHMITT, Bernd (Paul Scherrer Institut); TURCATO, Monica (European XFEL); ZHANG, Jiaguo (Paul Scherrer Institut)

**Presenter:** RAMILLI, Marco (European XFEL)

**Session Classification:** Application

**Track Classification:** Applications