Next generation of SAUNA systems
SAUNA III-Increased detection and localization capability

Helena Berglund
Director Technical Operations Scienta Sensor Systems

Scienta Sensor Systems in short

- Provides leading edge solutions for sensitive measurements of fission gas releases
- Part of the Scienta Scientific Group, a world leader in applied nuclear physics, providing sustainable solutions
- Unique collaboration with FOI, the Swedish Defence Research Agency, with R&D and analysis capability
- Several products in the SAUNA family (Swedish Automatic Unit for Noble Gas Acquisition)
- Certified according to, SS-EN ISO 9001:2015

Certificate of Registration

Intertek

This is to certify that the quality management system of

Scienta Sensor Systems AB

Main site: Vallongatan 1, SE-750 15 Uppsala, Sweden

has been assessed and registered by Intertek as conforming to the requirements of

ISO 9001:2015

The quality management system is applicable to

Development, manufacturing and sales of Noble Gas Detective Systems

Certificate Number: 35349-02
Initial Certification Date: 29 June 2009
Certificate Issue Date: 25 April 2017
Certificate Expiry Date: 28 June 2018

Duplicate / Translation from a Swedish original

Thomas Andersson, CEO
Intertek Certification AB
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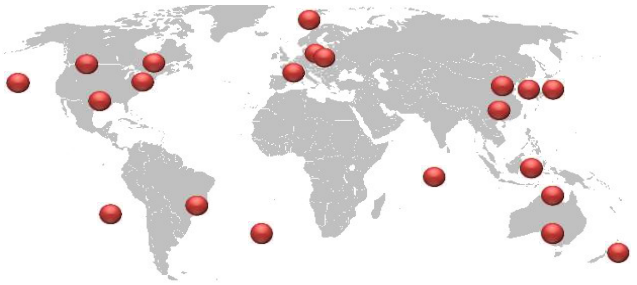
Scienta Sensor Systems in short

- Supplier of noble gas systems to Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO)
- Independent customers in e.g. South Korea, China, Middle East and USA
- Installed base of 37 operational systems worldwide
- Worldwide support via a network of partners



SAUNA II IMS System

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SAUNA PRODUCT FAMILY

SAUNA II Mobile Sampling Unit

SAUNA II

SAUNA II Laboratory System

TXL - Transportable SAUNA system

SAUNA-Field

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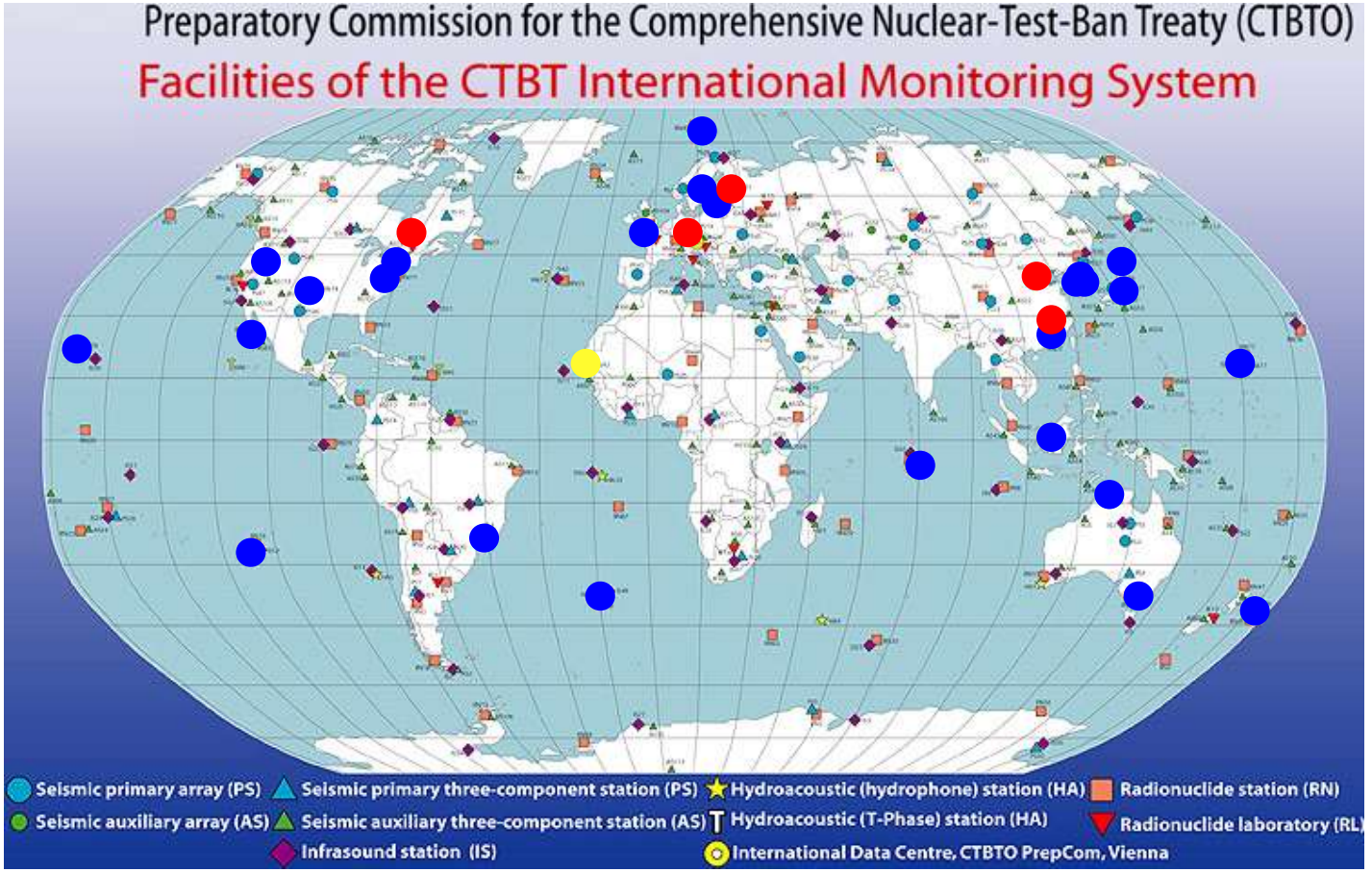
SAUNA network



SAUNA Product Road Map & Release Mgt

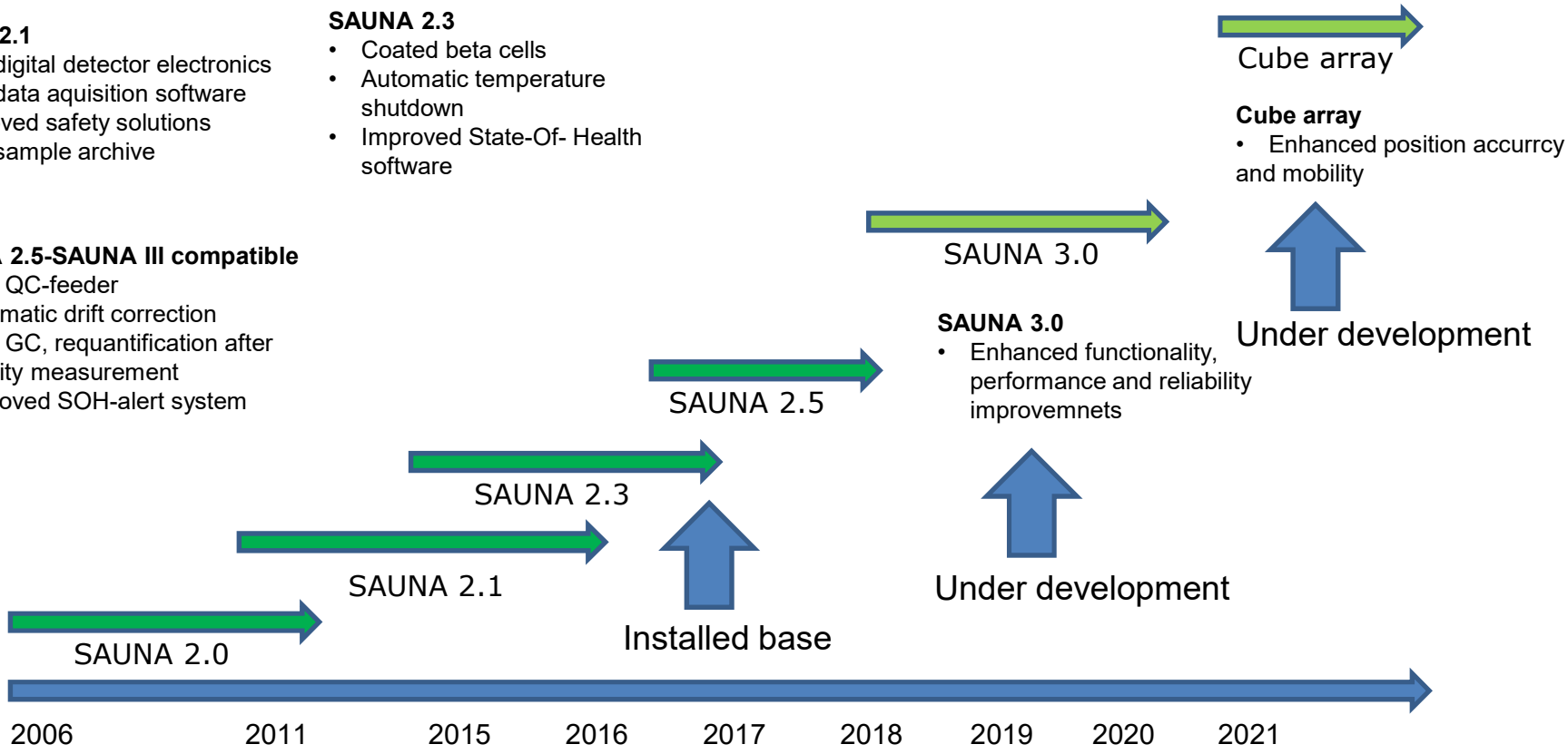
SAUNA 2.1
- New digital detector electronics
- New data aquisition software
- Improved safety solutions
- New sample archive

SAUNA 2.3
- Coated beta cells
- Automatic temperature shutdown
- Improved State-Of- Health software

SAUNA 2.5-SAUNA III compatible
- New QC-feeder
- Automatic drift correction
- New GC, requantification after activity measurement
- Improved SOH-alert system

SAUNA 3.0
- Enhanced functionality, performance and reliability improvemnets

Cube array
- Enhanced position accurrcy and mobility



SAUNA III

- Very sensitive, suitable at remote low background sites
- Higher time resolution (6 h) and
- Better detection limits (MDC:s) than SAUNA II increases the probability of detection and allows for more precise source localization
- Upgradeable path on existing installed base of SAUNA II
- Lower operational cost, N2 instead of He
- Automatic detector drift correction
- Improved QA/QC-xenon quantified before and after activity measurement
- New operator software

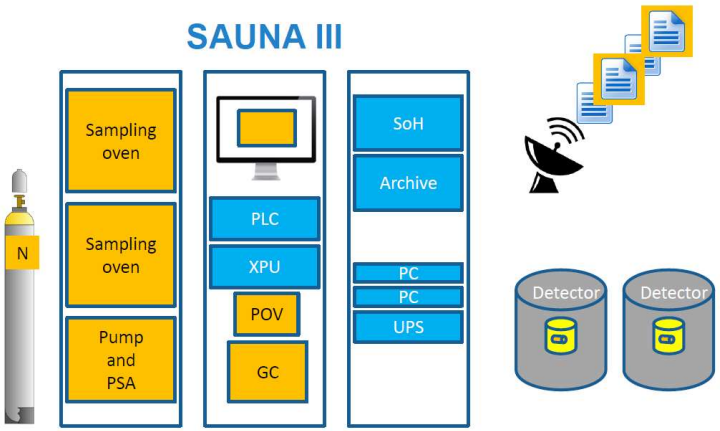


Fig. 2. SAUNA III as an upgrade of SAUNA II (in yellow the new components)

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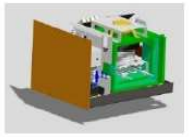
SAUNA III

Main components



SCU: Pump, water filter, heat-exchanger, flow-meter
PSA: Pressure Swing Adsorption (MS)
SOV: Sampling Ovens (MS and Ag-ETS).
POV: Process Oven (MS and CMS)
GC: Gas Chromatograph, same as SAUNA II
STU: Same as SAUNA II with new CMS –trap
DET: Detectors – SAUNA II concept with new beta cells

FOI

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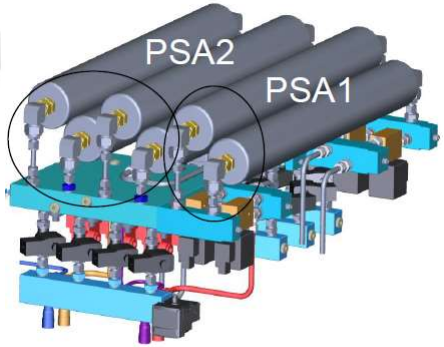
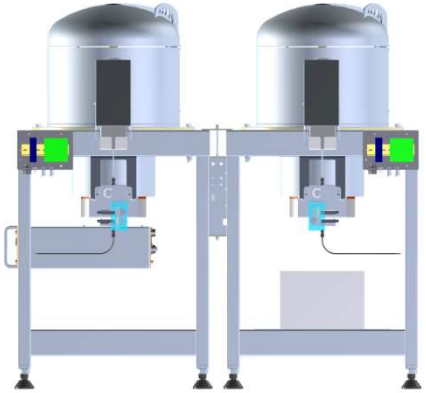
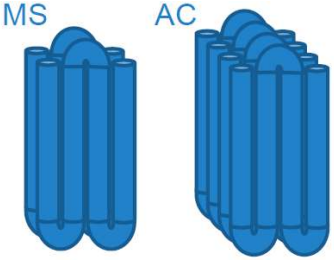
SAUNA III

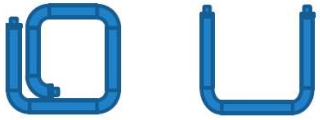


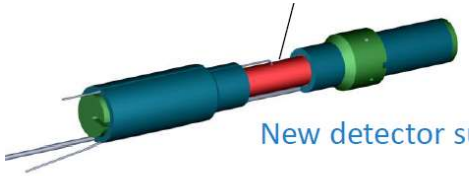


SAUNA II SOV MS AC



SAUNA III SOV MS Ag-ETS





New detector support

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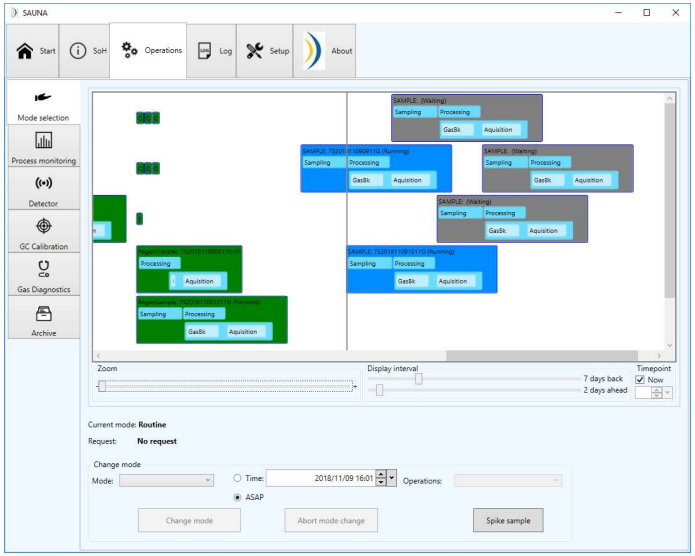
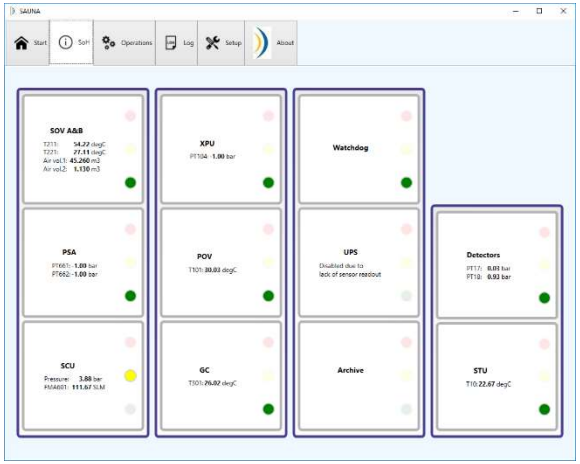
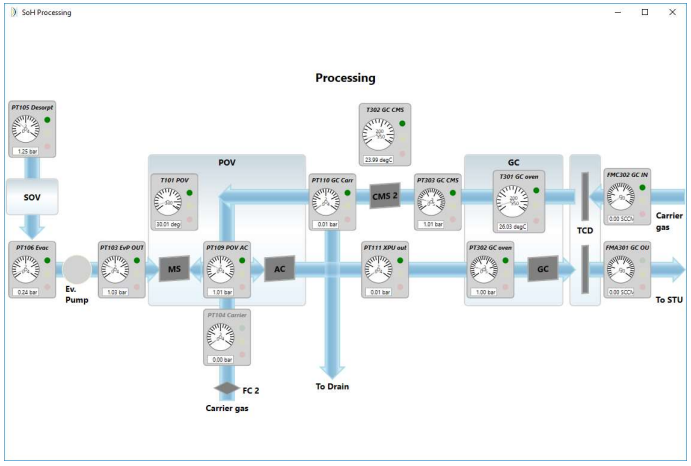
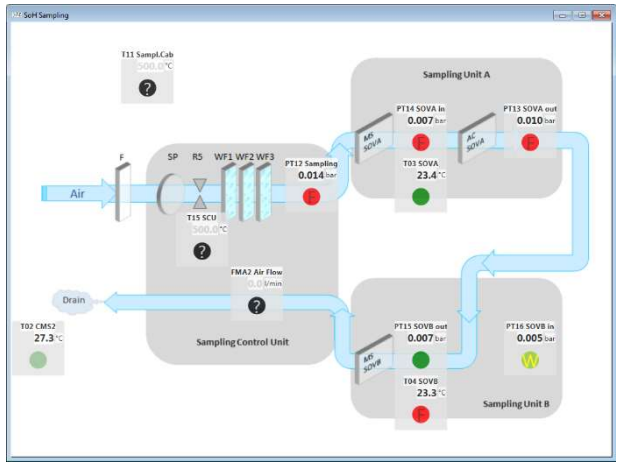
New operator software

- New GUI and operational software
- All user functionality included in one GUI
- Replaces the current GUI and SoHviewer
- Service functionality included
- Xecon4 integrated, allowing a full on-line sample analysis









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Specification

	SAUNA II	SAUNA III
Collection time (h)	12	6
Carrier gas	Helium	Nitrogen
Gas consumption (l/day)	300-450	380
Mean power (kW)	3	3.7
Peak power (kW)	5.5	6.0
Xe volume (cm3 at STP)	1.2	3
MDC Xe-133 (mBq/m3)	0.25	0.15
MDC Xe-131m (mBq/m3)	0.2	0.1
MDC Xe-133m (mBq/m3)	0.2	0.1
MDC Xe-135 (mBq/m3)	0.7	0.3
Detector dead volume (%)	<15	5

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SAUNA III installation

- Replace all modules in the first rack
- New trap in POV
- POV 2 disconnected
- New gas-lines between POV and XPU
- New trap in STU
- New β-detectors
- Upgraded PLC
- Upgraded software (WIN10)
- Same footprint and UPS

- Cost efficiency
- Work with exchange modules

SAUNA III producability

- Cost efficiency of the production process
- Standardization of the production
- Transfer of prototype drawings
- Final review
- Design of industrial solutions like vale block assemblies
- Serviceability final review
- Introducing all drawing s and component list into the production system
- Supplier evaluation
- No of suppliers per component
- Review of module test procedures-identifying stable key parameters for system set up
- Review of system test procedure

Serviceability

-Service interval
-Robustness of new components
-Redundancy
-No of unique components
-Location of components within the system
-Complexity of service
-PM programme
-Depot of recommended spares

Operationability

-User friendliness and ease of understanding the system
-Identifying service tasks possible for the user to perform
-SW interface user friendliness
-Manuals, trouble shooting procedures, operational routines
-Training program

Present status SAUNA III

-First 6 month testing at FOI has shown excellent performance

-All hardware and software of the industrial system installed and tested at Scienta Sensor Systems in Uppsala

-HW and SW stressed and tested in industrial environment

-Some challenges remains

-Field testing planned to start Q1 2019

-Manuals, trouble shooting procedures, operational routines under development

Thank you