

Company Overview

CAEN Group

Founded in 1979, **CAEN s.p.a.** (Costruzioni Apparecchiature Elettroniche Nucleare) is an important industrial spin-off of the INFN.

Core business: Electronic Instrumentation for physics experiments (world leader)

Spin-off activities:

- > **CAEN s.p.a.**
 - > **CAEN** SyS – CAEN Spectroscopy Division (2016)
 - > **CAEN** RFID s.r.l. (2003),
 - > **CAEN**els s.r.l. (2010),
 - > **CAEN**qS s.r.l. (2012),

Total Employees: 157



CAEN SyS
Systems and Spectroscopy Solutions

CAENqS
build security awareness

CAENels
Gear For Science

CAENRFID
THE ART OF IDENTIFICATION

Quality Certification

IQNet
THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

CISQ/IMQ has issued an IQNet recognized certificate that the organization:

C.A.E.N. SPA
VIA VETRAIA 11 - 55049 VIAREGGIO (LU)
VIA MONTECRISTO 7 - 57037 PORTOFERRAIO (LI)

has implemented and maintains a Quality Management System for the following scope:

Design, manufacturing and test of electronic equipment
Further clarifications regarding the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization

which fulfills the requirements of the following standard:

ISO 9001:2015
Issued on: **2018 - 06 - 20**
Expires on: **2021 - 06 - 20**

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration Number: IT - 1066

IQNet Partners*
AENOR Spain AFNOR Certification France AFPCR Portugal CCC Cyprus CISQ Italy
CQC China CQM China CQS Czech Republic Cio Cert Croatia DQS Holding GmbH Germany FCAV Brazil
FUNDONORMA Finmeccanica ICONTEC Colombia Inspecta Serfiteflanti Oy Finland INATECO Costa Rica
IRAM Argentina IQA Japan KQ Korea MBTEC Greece MSZT Hungary Nankai AS Norway NSAI Ireland
NYCE-SIGE Mexico PCBC Poland Quality Austria Austria RR, Russia SII Israel SIQ Slovenia
SIRIM QAS International Malaysia SQS Switzerland SRAC Romania TEST St Petersburg Russia TSI Turkey YUQS Serbia
IQNet is represented in the USA by: APOCOR Certification, CISQ, DQS Holding GmbH and NSAI Inc.

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

www.imq.it

CERTIFICATO N. 9105.CAEN
CERTIFICATE N.

SI CERTIFICA CHE IL SISTEMA QUALITÀ DI
WE HEREBY CERTIFY THAT THE QUALITY SYSTEM OPERATED BY

C.A.E.N. SPA
VIA VETRAIA 11 - 55049 VIAREGGIO (LU)
UNITÀ OPERATIVE / OPERATIVE UNITS

VIA VETRAIA 11 - 55049 VIAREGGIO (LU)
VIA MONTECRISTO 7 - 57037 PORTOFERRAIO (LI)

E' CONFORME ALLA NORMA / IS IN COMPLIANCE WITH THE STANDARD

ISO 9001:2015

PER LE SEGUENTI ATTIVITÀ / FOR THE FOLLOWING ACTIVITIES
Progettazione, fabbricazione e collaudo di apparecchiature elettroniche
Design, manufacturing and test of electronic equipment

Ulteriori informazioni riguardanti l'applicabilità dei requisiti ISO 9001:2015 possono essere ottenute consultando l'organizzazione
Further clarifications regarding the applicability of ISO 9001:2015 requirements may be obtained by consulting the organization

IL PRESENTE CERTIFICATO È SOGGETTO AL RISPETTO DEL
REGOLAMENTO PER LA CERTIFICAZIONE DEI SISTEMI DI GESTIONE
THE USE AND THE VALIDITY OF THE CERTIFICATE SHALL SATISFY THE
REQUIREMENTS OF THE RULES FOR CERTIFICATION OF MANAGEMENT SYSTEMS

DATE:	PRIMA CERTIFICAZIONE FIRST CERTIFICATION	EMISSIONE CORRENTE CURRENT ISSUE	SCADENZA EXPIRY
	1998-02-16	2018-06-20	2021-06-20

ING. S.p.A. - VIA QUINTILIANO, 41 - 20138 MILANO ITALY
Management Systems Division - Pavia Design

IAF: 19

SOQ N° 005 A

Organismo di Certificazione Federale CISQ
www.imq.it

CISQ è la Federazione Italiana di Organismi di
Certificazione del sistema di gestione qualità.
CISQ è the Italian Federation of Management
System Certification Bodies.

Worldwide presence

Worldwide sales network offices in Italy, Germany, USA, Distributors in more than 30 countries.

Portfolio: > 5000 customers

**Customers Include all world leading research centres as:
Europe: CERN, INFN, CEA, CNRS; GSI, ESO, ISIS, Ganil, PSI, ...**

USA: FNAL, SLAC, Los Alamos, BNL, Jlab, ...

Asia: J-Park, KEK, Riken, IHEP, TIFR, ...

Africa: iThemba Labs, ...

And private companies:

GE, Siemens, SAIC, L3, Raytheon, Lockheed...





Milestones: 1979 - 2019

- > 1979: established in Viareggio by a group of senior engineers from INFN
- > 1986: first High Voltage Power Supply System (400.000 HV channels delivered worldwide in 30 years)
- > 1991: CAEN started VME design for nuclear market (1991-2016: 600.000 FE & DAQ channels delivered worldwide)
- > 1994: CAEN Microelectronics spin-off
- > 1996: CAEN Aerospace spin-off
- > 1997: UNI EN ISO 9001 quality certification
- > 1998: Started electronic design for LHC/CERN experiments (1998-2016: 8.500 electronic devices 250.000 boards/sub-boards)
- > 2001: UNI EN ISO 9001: Vision 2000
- > 2003: CAEN RFID spin-off (Radiofrequency Automatic Identification)
- > 2005: CAEN Technologies Inc., a CAEN branch company in the US
- > 2006: CAEN GmbH, A CAEN branch company in Germany
- > 2010: CAEN els spin-off (Accelerator Electronic Instrumentation)
- > 2012: CAEN qS spin-off (Cyber Security)
- > 2016: CAEN SyS started (Systems and Spectroscopy Division)

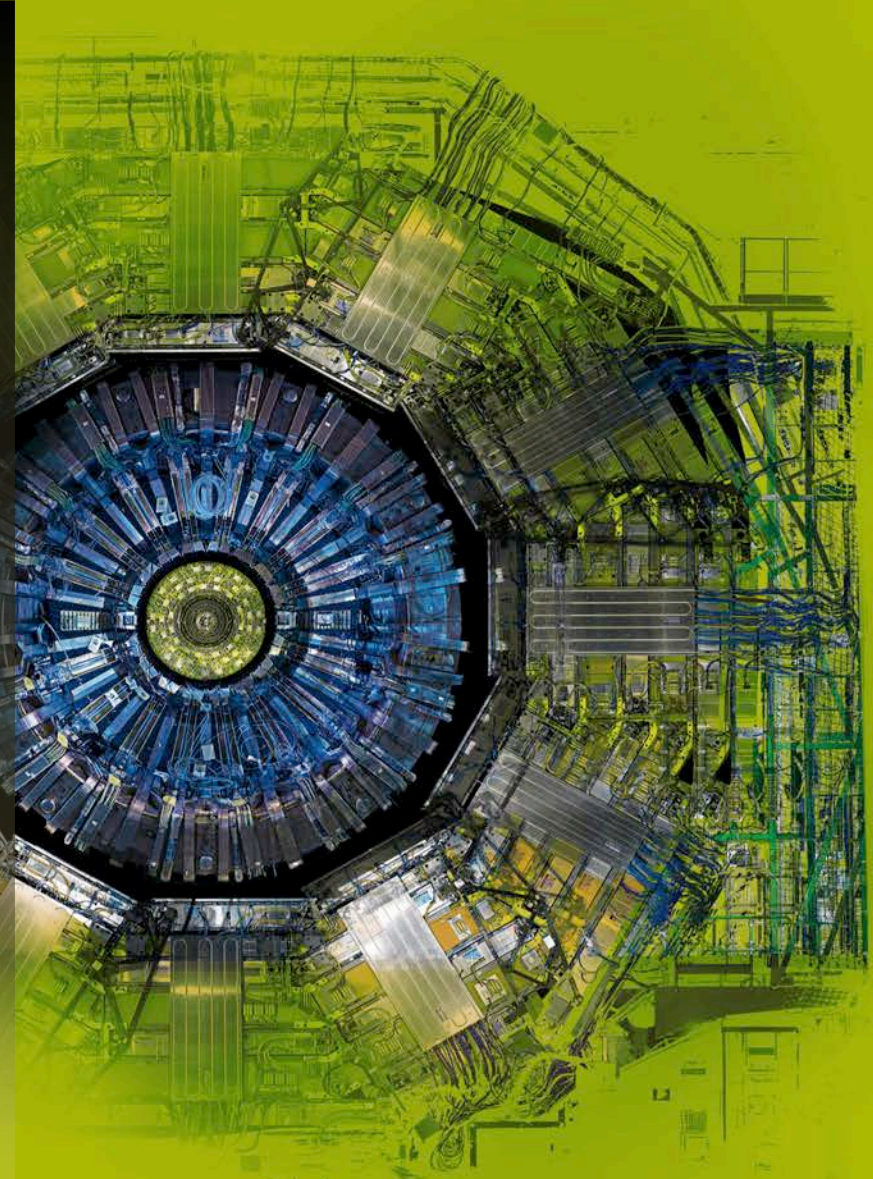


Market

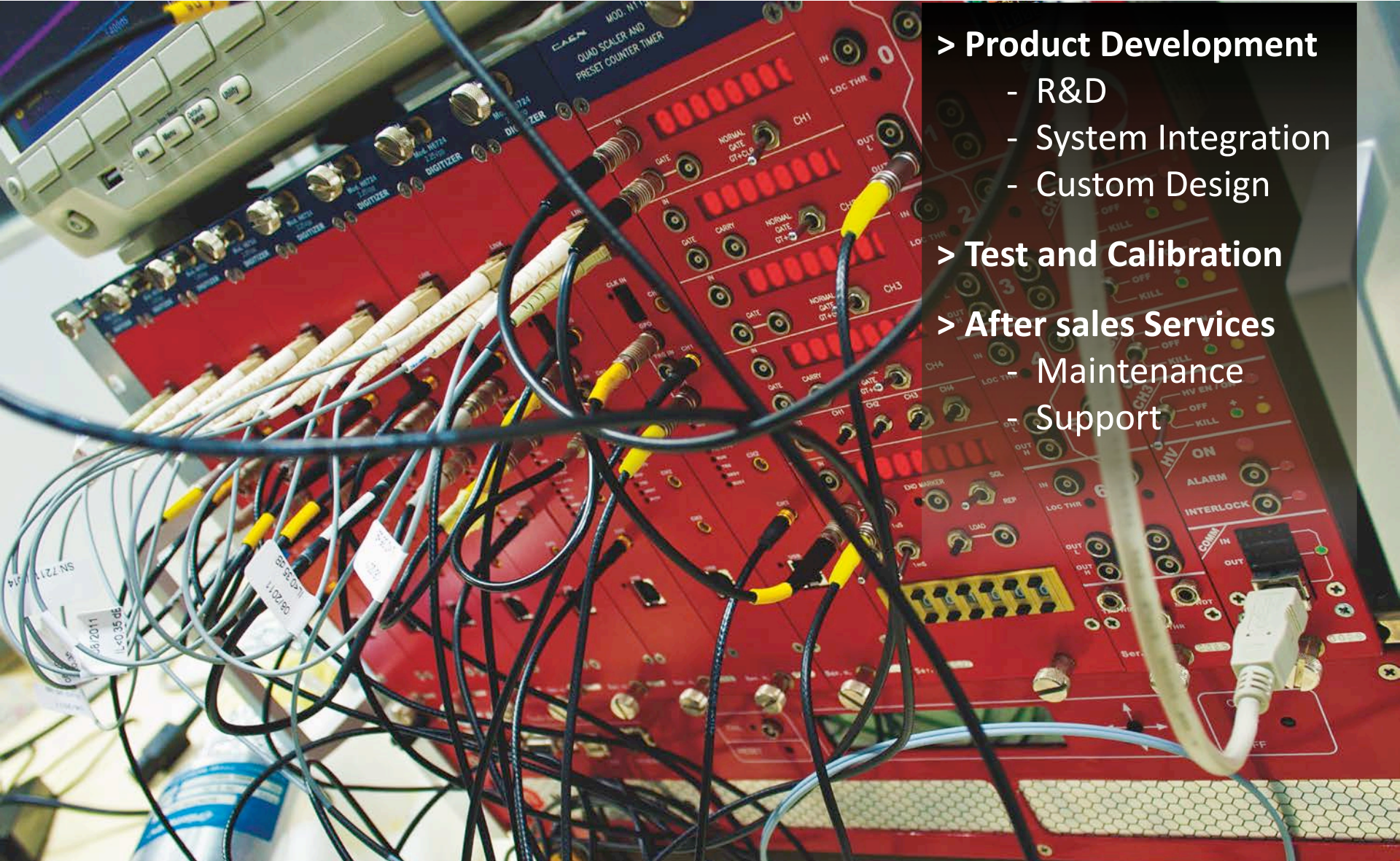
For more than 40 years CAEN has been providing Scientists and Engineers with the most advanced electronic instrumentation for any particle or radiation detectors

Strong of an extremely close collaboration with the world major research laboratories CAEN is proud to produce the best tools for:

- > High Energy Physics
- > Astrophysics
- > Neutrino Physics
- > Dark Matter Investigation
- > Nuclear Physics
- > Material Science
- > Medical Applications
- > Homeland Security
- > Industrial Applications
- > Spectroscopy Applications



Key strengths



> Product Development

- R&D
- System Integration
- Custom Design

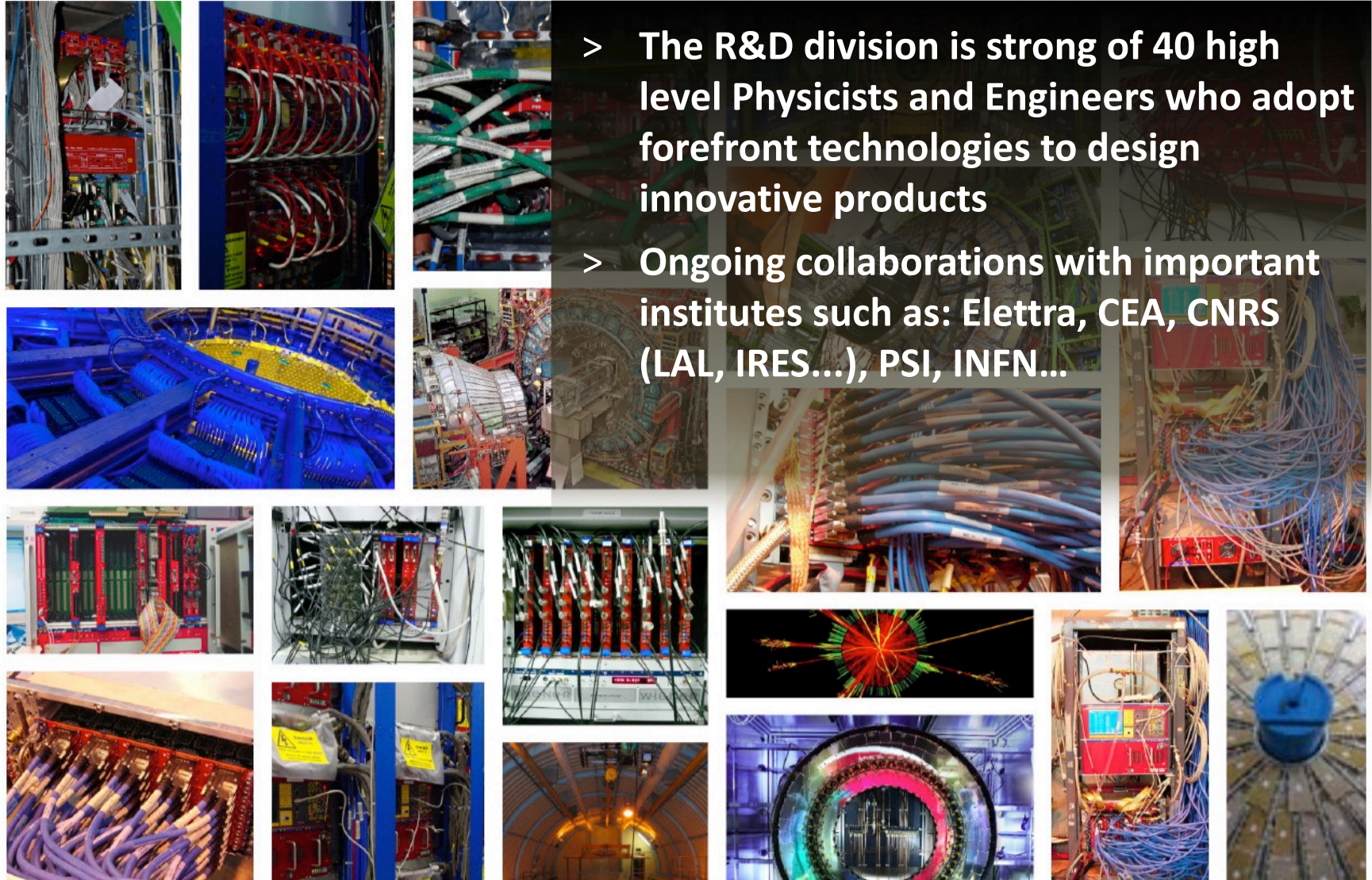
> Test and Calibration

> After sales Services

- Maintenance
- Support



Product Development

- 
- > The R&D division is strong of 40 high level Physicists and Engineers who adopt forefront technologies to design innovative products
 - > Ongoing collaborations with important institutes such as: Elettra, CEA, CNRS (LAL, IRES...), PSI, INFN...

Test



- > All assembling activities are outsourced
- > Experienced group of 25 engineers dedicated to in-house Test and Calibration of the entire production
- > Capability: 500 complex modules/month
- > All procedures are ISO certified providing the complete traceability of the products



Maintenance and Support services

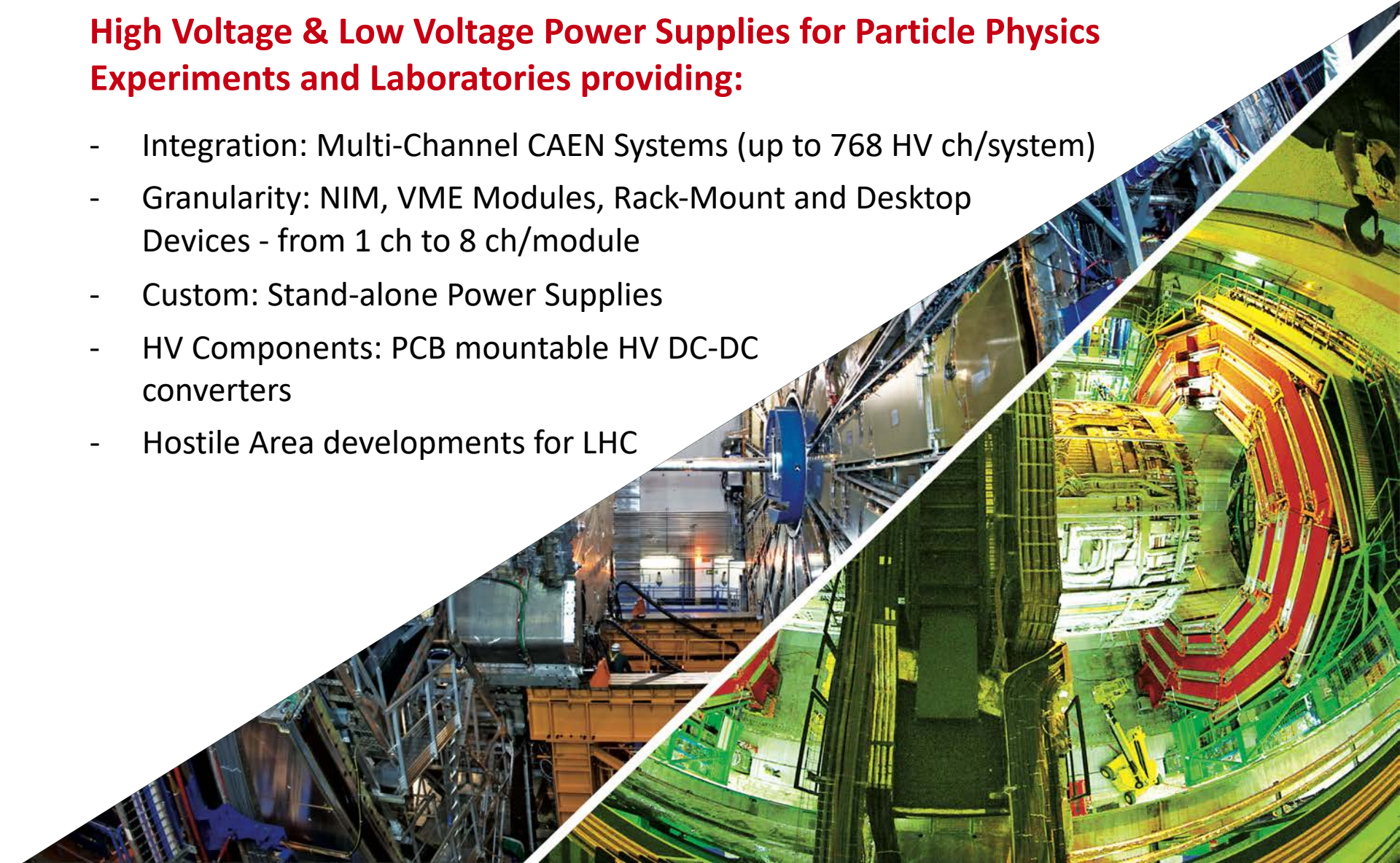
- > Excellent pre - and after - sales support
- > Strong maintenance division (25 engineers)
- > Long Term Maintenance Contract (CERN 10 years and more)
- > On line support service
- > Short intervention time (on request, on-site within one day only in Europe)
- > Short delivery (on request worldwide)



Power Supplies Expertise

High Voltage & Low Voltage Power Supplies for Particle Physics Experiments and Laboratories providing:

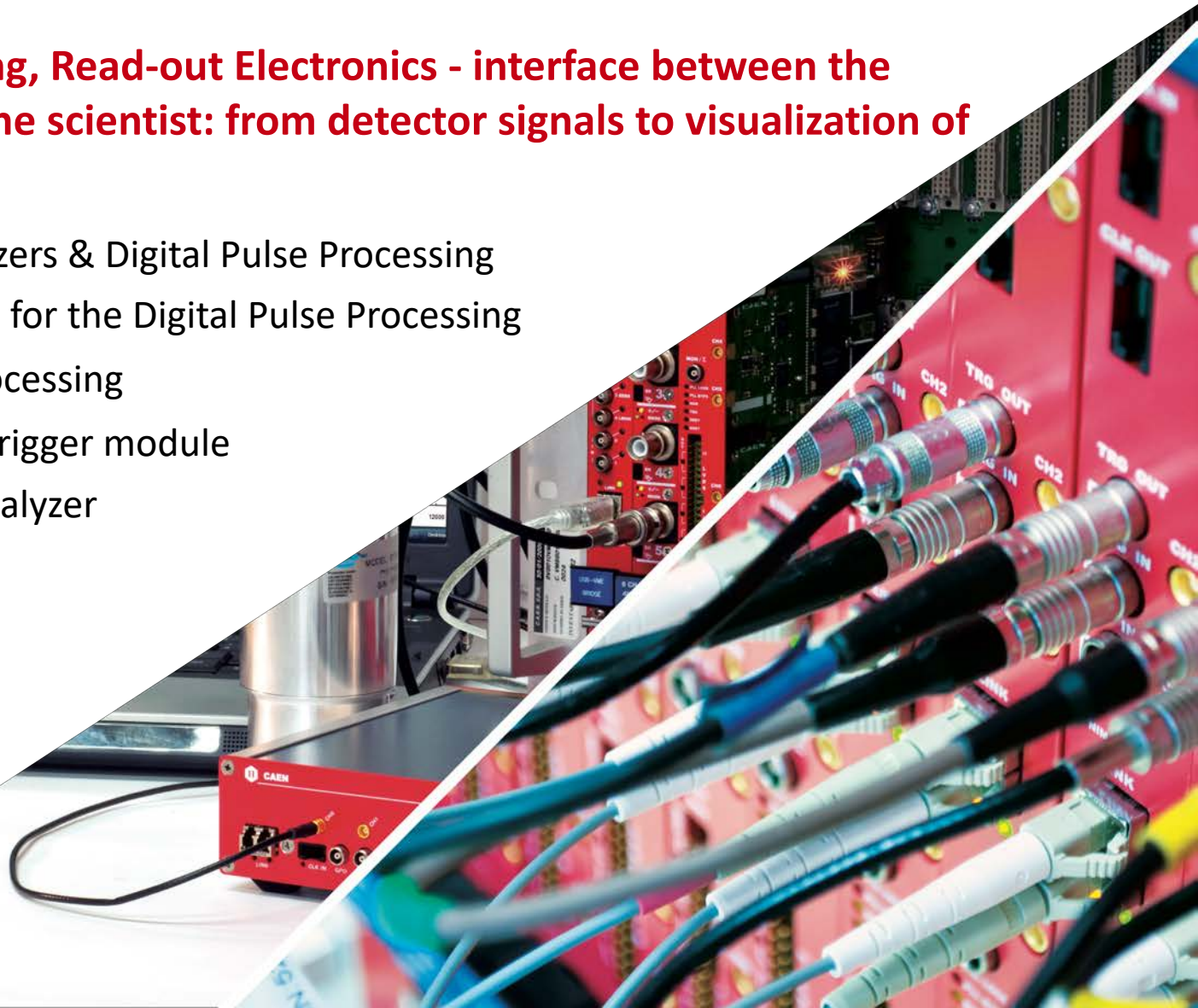
- Integration: Multi-Channel CAEN Systems (up to 768 HV ch/system)
- Granularity: NIM, VME Modules, Rack-Mount and Desktop Devices - from 1 ch to 8 ch/module
- Custom: Stand-alone Power Supplies
- HV Components: PCB mountable HV DC-DC converters
- Hostile Area developments for LHC



Pulse Processing Expertise

Signal Conditioning, Read-out Electronics - interface between the experiment and the scientist: from detector signals to visualization of data!

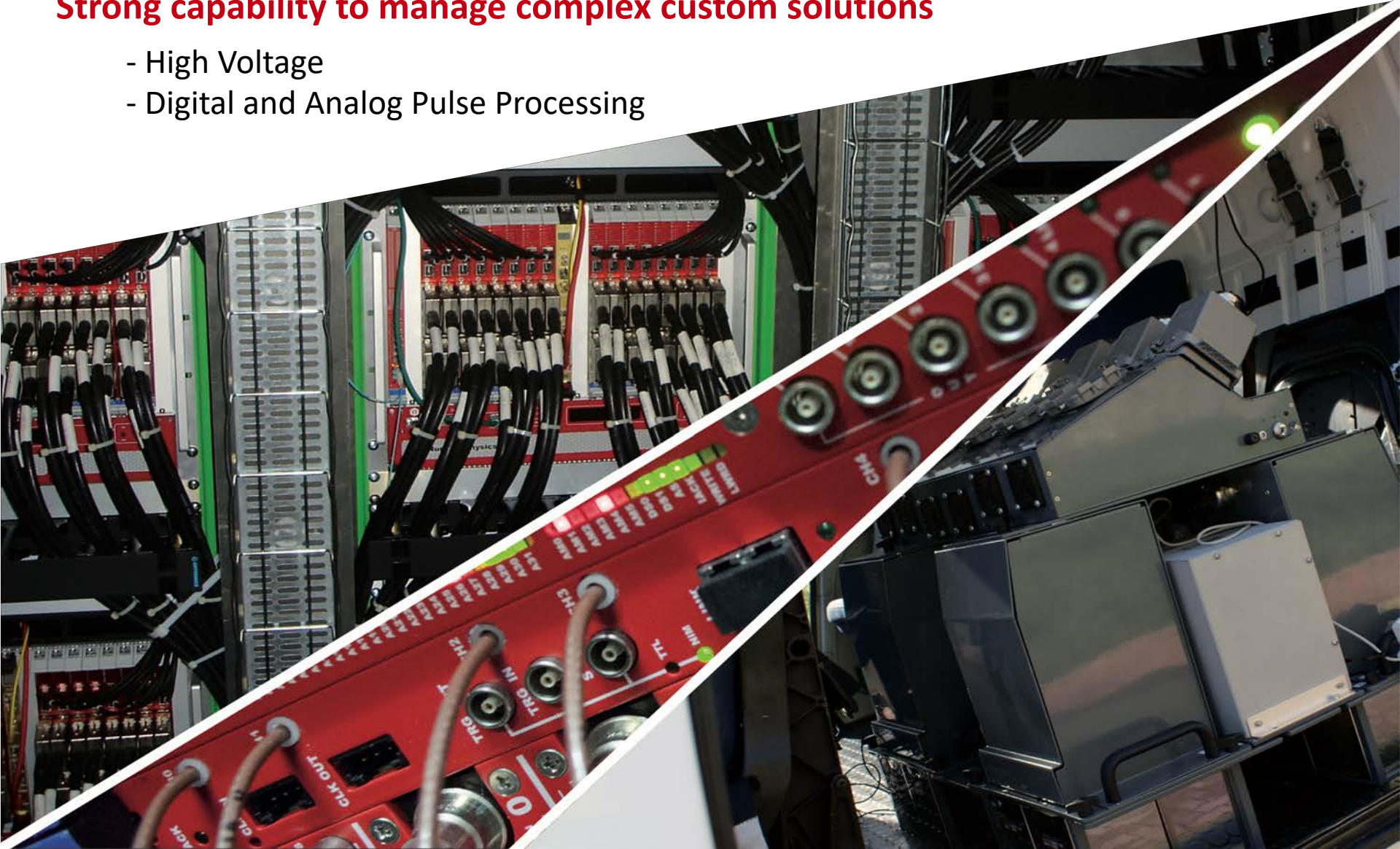
- Waveform Digitizers & Digital Pulse Processing
- FPGA algorithms for the Digital Pulse Processing
- Analog Pulse Processing
- Programmable Trigger module
- Multichannel Analyzer
- Preamplifiers
- Custom project



Custom Developments: Case History

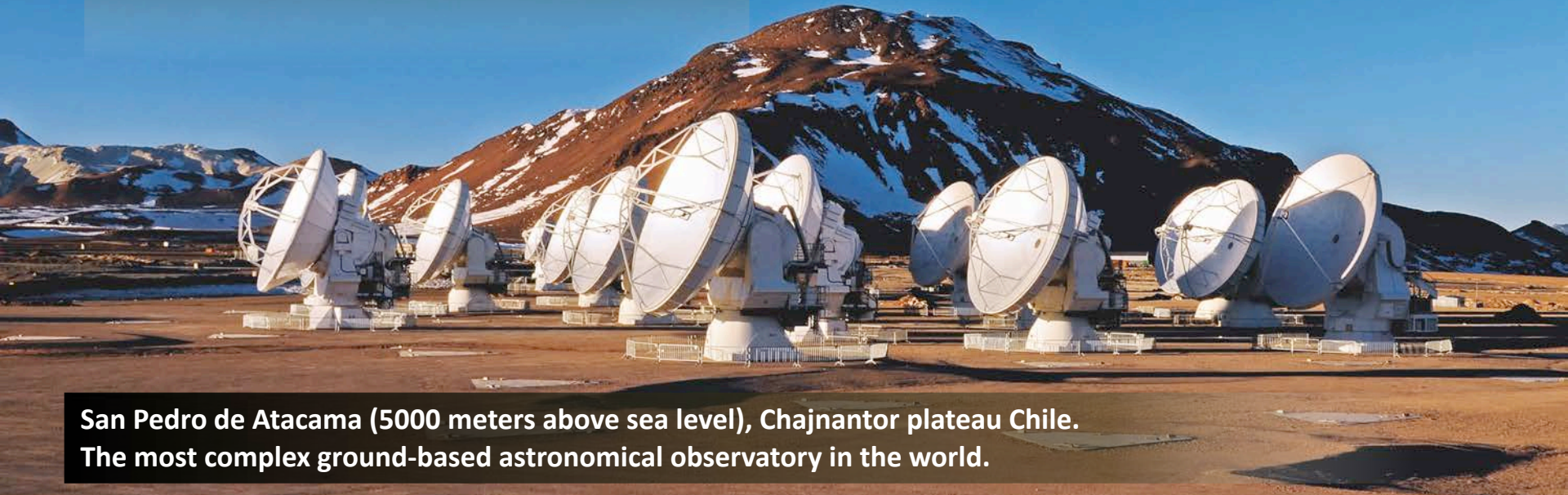
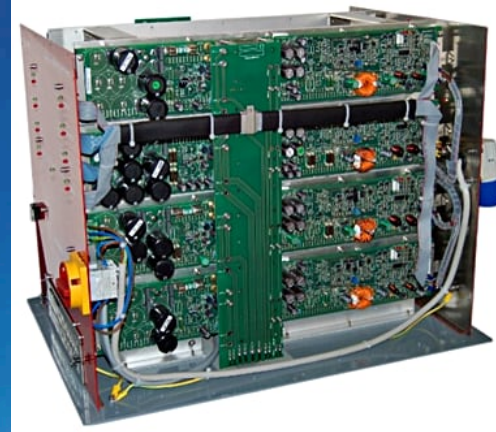
Strong capability to manage complex custom solutions

- High Voltage
- Digital and Analog Pulse Processing



LV Power Supply for ALMA (ESO)

- > Design of custom LV Power Supply System for ALMA
- > **86 Complex LV Systems delivered (688 power channels)**
- > **Harsh environmental condition (desert at 5,000 m altitude)**
- > **Designed to operate for at least 30 years; 24/7 (24 hours a day, seven days a week)**



San Pedro de Atacama (5000 meters above sea level), Chajnantor plateau Chile.
The most complex ground-based astronomical observatory in the world.

NA62@CERN

CAEN was contract-awarded to design and manufacture the Calorimeter REAdout Module (CREAM) for the NA62@CERN Liquid Krypton Calorimeter (LKr)

- > VME 6U form factor
 - 32 channel
 - 14 bit 50 MS/s ADC
 - 2 Vpp input dynamics (differential)
 - 14-bit programmable DC offset adjustment ($\pm 1V$)
 - Memory buffer:
 - 26 MB circular buffer
 - 5.2 GB event buffer
 - Gbit Ethernet port for data readout
 - VME64X compliant interface

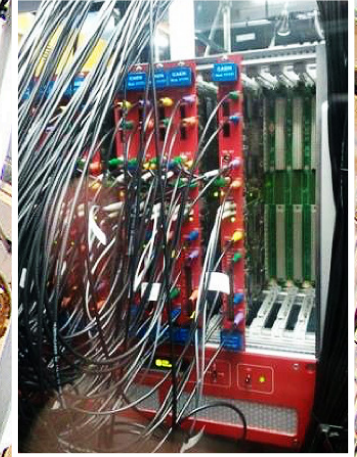


455 modules - 13,249 read-out channels

XMass @ Kamioka, Japan

- > Dark Matter experiment using a liquid Xenon TPC
- > Equipped with 84 digitizers modules
- > 672 channels - 10 bit @ 1GHz

Readout Bandwidth = ~ 2 MB/s/ch
Total aggregate throughput = ~ 1 GB/s

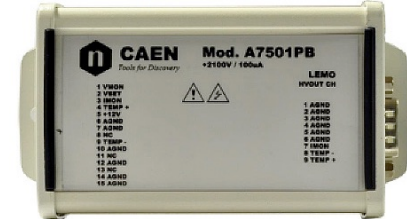
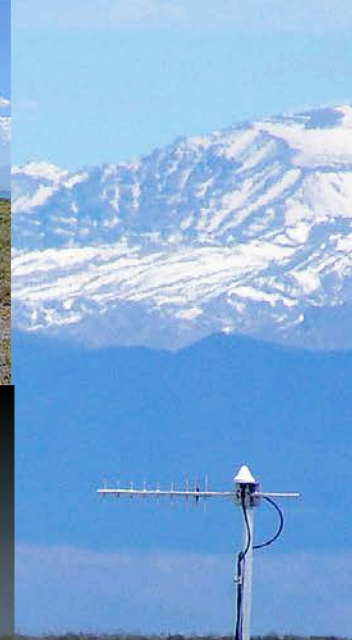


Pierre Auger Observatory

- > Based on A7501 PCB mount HV DC-DC converter
- > **Extended Temperature working range: -10°C ÷ 70°C**
- > **Designed for long working life in harsh environment**



- > A detection area of 3.000 km² (the size of Luxembourg)
- > Mendoza Province (Argentina)



- > High efficiency
- > 2100 V/100 μA output ranges
- > Available with positive or negative polarity
- > Stand alone architecture
- > Compact package: 34,5 x 62,9 x 119 mm³

A tailored solution for Large Area experiments in harsh environment: A7501PB

International Atomic Energy Agency

- > 12 liquid scintillators
- > Digital DPP and Waveform readout
- > Sustained throughput: 340 MB/s



The Fast Neutron Collar (FNCL) is a liquid scintillator-based instrument developed as an efficient NDA (non destructive assay - test) tool for verification of modern NPP's Fresh Fuel Rods

GammaFly: Airborn Gamma Spectroscopy

Aerial monitoring system of environmental radioactivity with applications in:

- > Homeland security
- > Environmental protection
- > Geological and soil mapping
- > Uranium and mineral exploration
- > Mineral/gas and oil processing
- > Environmental radioactivity monitoring

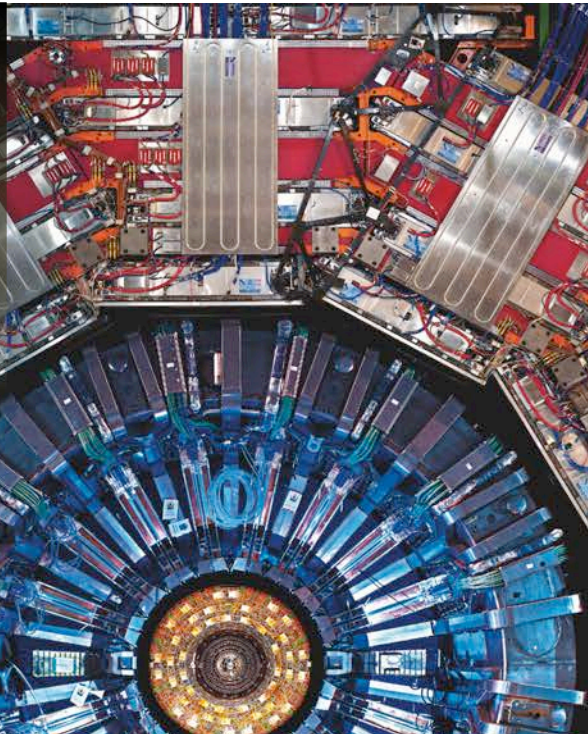


4x4 array of 1 liter NaI detectors

CERN/LHC Electronics in Hostile Environments

“EASY” Multi Function System

- > 2 kGauss magnetic field
- > $1 \cdot 10^{11}$ p/cm² TD - 15 kRad TID
- > $2 \cdot 10^{12}$ n/cm² TD



Designed with COTS components to work in “hostile” areas

CAEN & LHC Experiments

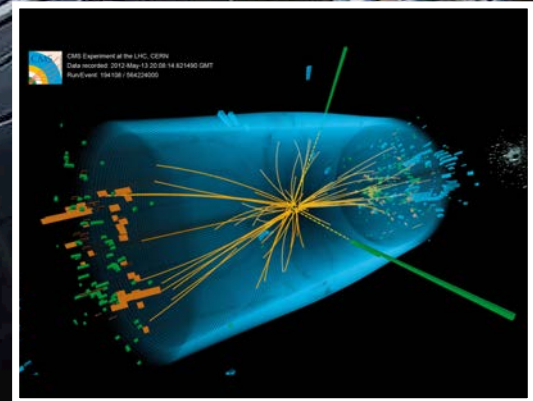
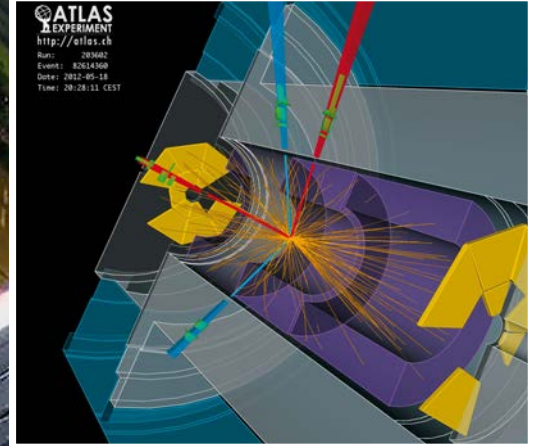
1998 – 2019

SYNERGY for SUCCESS

21 years of joint efforts to achieve top performances

> 8.500 electronic devices

> 250.000 boards/sub-boards



CAEN has received the "CMS Crystal Award" for the development and production of the power system for the CMS/LHC Tracker

CAENels – Gear for Science



Application fields:

- > Oriented and dedicated to particle accelerator facilities, e.g. synchrotron light sources and Free Electron Lasers
- > “Know-how” and “hands-on” large installations and maintenance
- > CAEN industrial capability
- > Customization and dedicated support

Product Lines

Digital Magnet Power Supplies

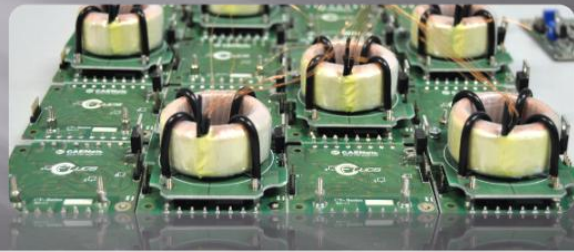
Bipolar + Monopolar

from $\pm 5A$ (small correctors) to 135A

Ethernet Interface



**MAGNET
POWER
SUPPLIES**



**PRECISION
CURRENT
TRANSDUCERS**



DC Current Transducers

Closed-loop Technology

DC + AC monitoring

Current monitoring up to kA

Multi-channel Low Current Measurements

Dedicated Systems (Bipolar HV for Optics)

Beamline Local Feedback Integrated System



**BEAMLINE
ELECTRONIC
INSTRUMENTATION**



**MTC4
MicroTCA
For Physics**



MicroTCA for Physics

High-Voltage Board

Collaboration with DESY



Facilities that rely on us

- APS – Advanced Photon Source, Argonne (Chicago, USA)
- ALS – Advanced Light Source, LBNL (Berkeley, USA)
- BNL – Brookhaven National Lab (Brookhaven, USA)
- CLS – Canadian Light Source (Canada)
- DESY – Deutsches Elektronen-Synchrotron (Germany)
- ELETTRA – Elettra Light Source (Italy)
- ESRF – European Synchrotron Radiation Facility (France)
- JLAB – Thomas Jefferson Lab (Newport News, USA)
- KEK – Photon Factory, cERL (Tsukuba, Japan)
- PAL – Pohang Accelerator Laboratory (South Korea)
- RRCAT – Raja Ramanna Centre for Advanced Technology (India)
- SLRI – Synchrotron Light Radiation Institute (Thailand)
- SPARC – INFN Frascati (Italy)

and companies:
KYMA Undulators, BRUKER ASC



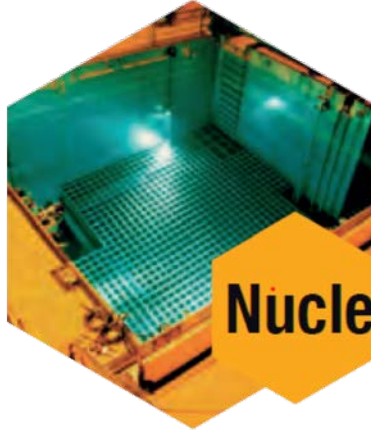


CAEN SyS - CAEN Spectroscopy Division

What we do - providing nuclear measurement solutions and technical expertise for a wide array of applications.



Nuclear Security



Nuclear Safety



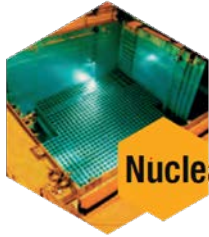
Laboratories



Customization



Nuclear Safety & Security



Nuclear Safety

All systems are designed to enhance workforce safety, maintain the assets of a nuclear facility, and protect and safeguard the public and the environment

Environmental Monitoring



Spectroscopy system with integrated RFID tech.



Nuclear Security

Systems to search, identify and map radioactive sources and special nuclear material to avoid the illegal traffic of radioactive materials





Laboratories & Customization



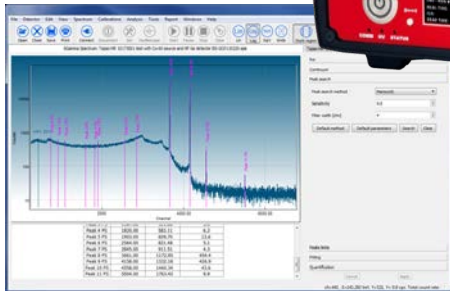
Laboratories

Educational activities, specialized employees training and top performance nuclear radiation measurements for laboratory applications



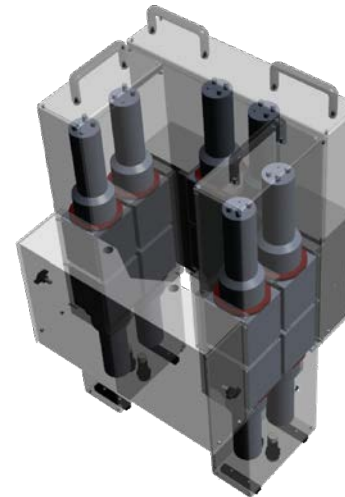
Customization

Working for developing and deploying a fully customizer solution based on requirements of the client



Dual 32k digital MCA

Quantitative spectroscopy software



Nuclear fresh fuel measurement system





CAEN RFID

- > The first Italian company providing UHF RFID products
- > Key player in the EU RFID scenario (EPCglobal, ETSI...)
- > Worldwide customers in manufacturing, logistics, transport, healthcare, fashion, retail...
- > Totally in-house HW, SW & support skills
- > Key partner in EU funded projects
- > An “added value manufacturer”





CAEN RFID



UHF RFID is an enabling technology for several fields of applications:

- > Embedded
- > Fashion - Retail
- > Cold Chain - Pharma
- > Waste Management
- > Access Control
- > Industrial Manufacturing
- > Transportation - Logistics
- > FMCG - Supply Chain
- > Leisure
- > We are the Technology provider & design center for Datalogic Spa

 **DATALOGIC**



CAEN_{qS}

STRATEGIC PARTNER



STONESOFT

FIREMON



ForeScout



Check Point
SOFTWARE TECHNOLOGIES LTD



- **Solutions**

- Next Generation Security
- Threats and vulnerabilities Protection
- Mobility and endpoint Security
- Next Generation Network

- **Services**

- Managed Security Services
- Technologies Consulting
- Risk & Vulnerability Assessment
- Compliance Consulting



CAENqS Solutions

Security Architecture

- IT security strategy definition, roadmap and approach
- Definition and design of security controls and solutions
- People, process, technology and data security assessment
- Security policies and processes
- Operations and monitoring
- Business impact analysis
- Security risk assessment

Threats and Vulnerabilities

- Vulnerability assessment
- Penetration test
- Wireless security test

Managed Security Support

- SOC Support Call
- Professional Assistance
- Service On-Site

Winning Synergies

CAEN is always open to cooperate with its Partners and Customers to evaluate new projects and partnerships

