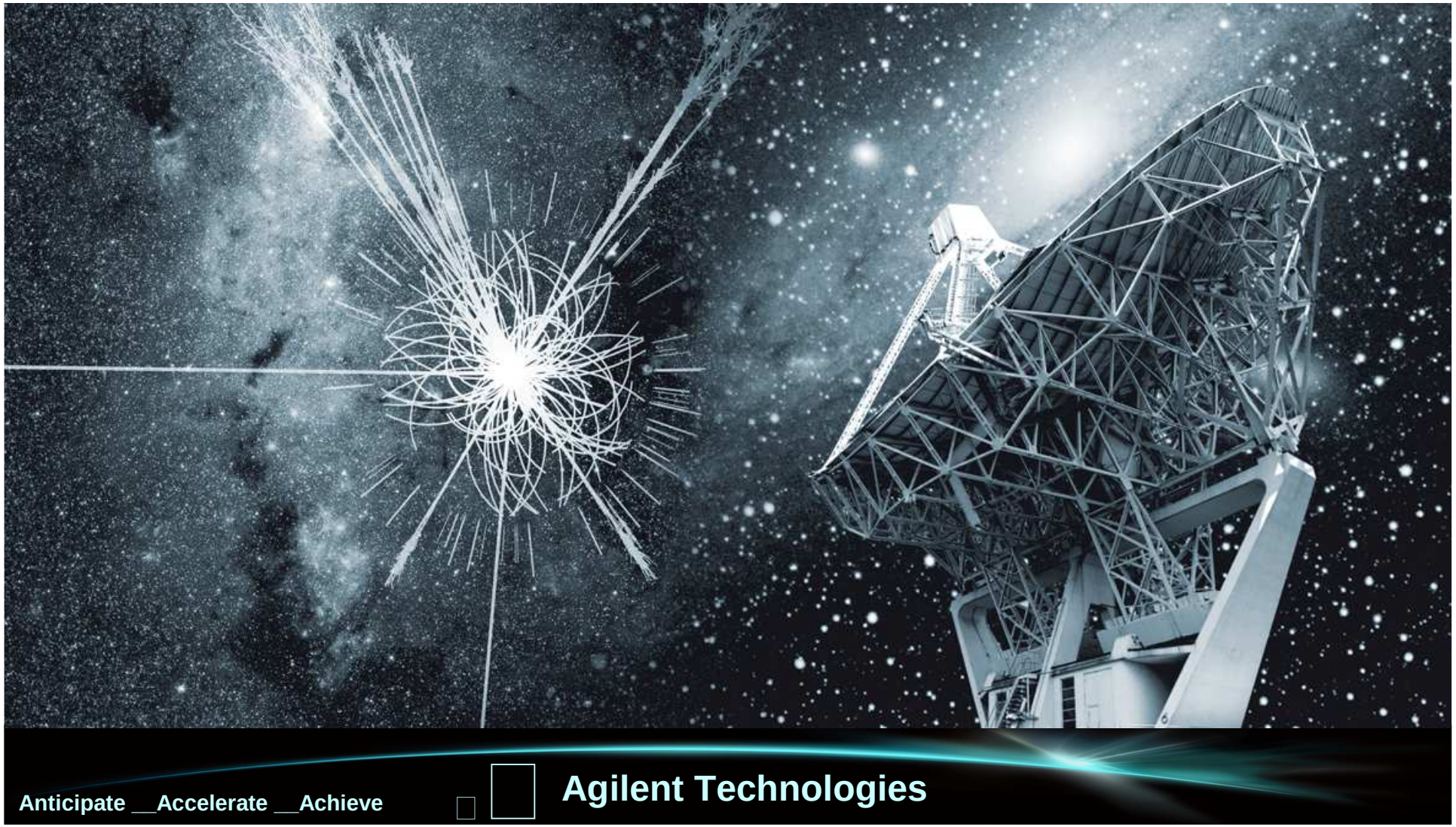
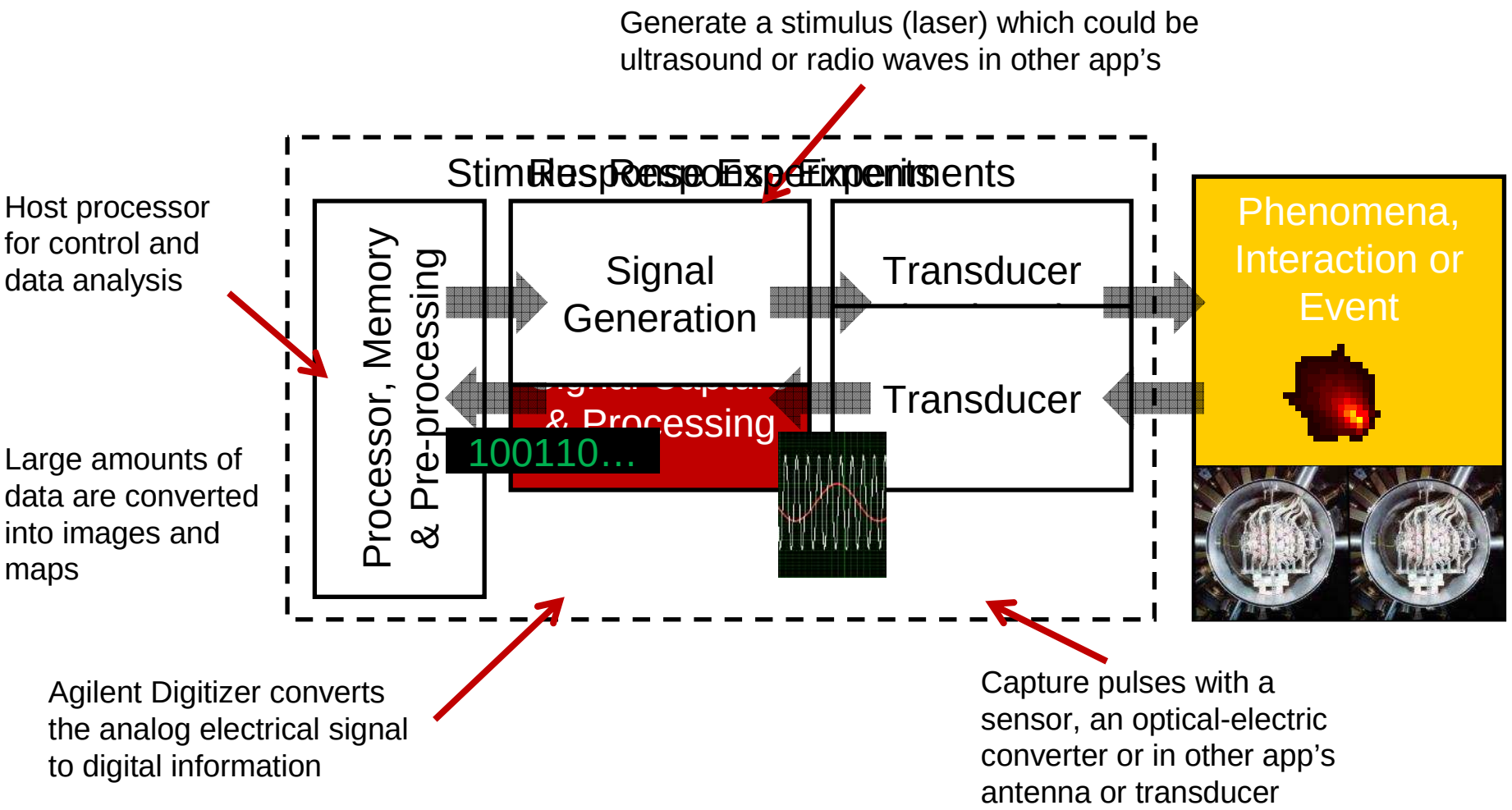
Advanced Multi-Channel Digitizer Technology



High-Speed Digitizer Usage



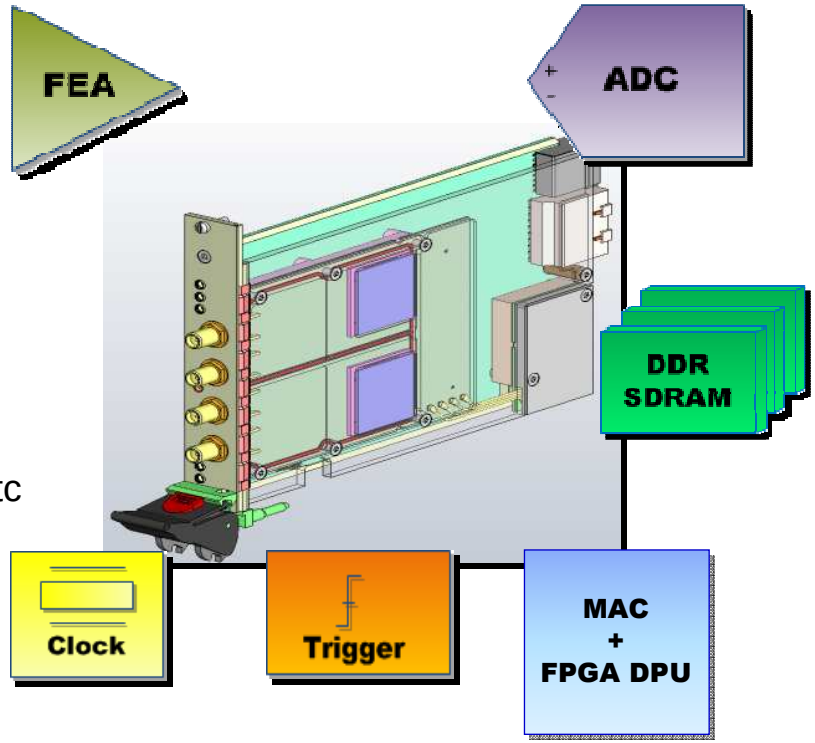
Size/power, speed, accuracy & lower cost of ownership

High-Speed Digitizer Technology Expertise

A core of 30+years of cumulative research and development experience in developing with ADC technology.

High-Speed Digitizer design team:

- Best in class high-speed ADC implementation
- Small footprint and low power consumption
- High measurement throughput
- ASIC design: Ultra Low Noise Clock Chip, Trigger Chip, etc
- IP and technical know-how
- Multiple OS and software environment
- Advanced firmware development



Different form factors for different applications

www.agilent.com/find/PhysicsAXIe

M9703A *NEW* AXIe High-Speed Digitizer

Agilent M9703A AXIe High-Speed Digitizer

Widest bandwidth, high flexibility and dynamic range on a large number of phase-coherent channels

Test & Measurement World BEST IN TEST 2013 AWARD WINNER

AXIe

Key Features

- **12 bit resolution**
- **8 channels @ 1.6 GS/s**
- Interleaving option to get **4 ch @ 3.2 GS/s**
- DC to 2 GHz input frequency range
- **Real-time flexible digital downconversion (DDC) on 8 phase-coherent channels** NEW
- Up to 256 MS/ch memory with segmented acquisition
- > 650 MB/s data transfer
- **Agilent 89600 VSA Software support** NEW

M9703A OS support

- Windows
- XP (32-bit)
- Vista (32/64-bit)
- 7 (32/64-bit)
- Linux

Drivers – MD1 software

- IVI-C, IVI-COM
- LabVIEW
- Matlab (through IVI-COM)

OTS application software

- MD1 soft front panel
- AcqirisMAQS U1092A-S01/S02/S03
- 89600 VSA software

Single-shot event applications

Capturing an unrepeatable event

One shot measurements

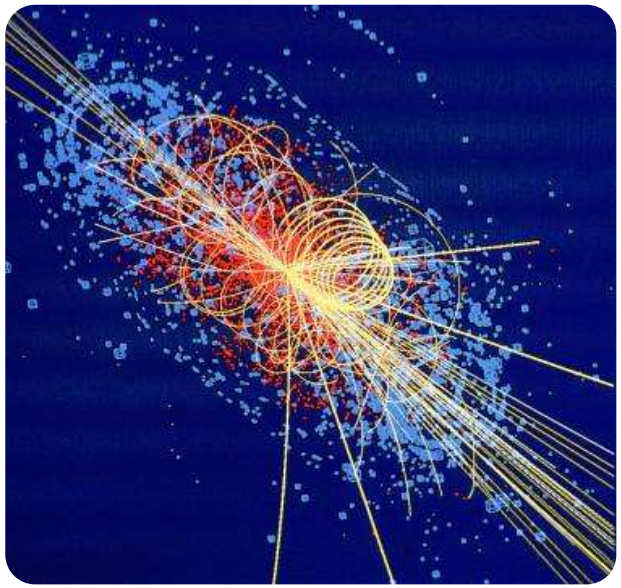
Capturing an interaction from multiple viewpoints

Applications include:

Shock physics events

Particle collisions

Gamma telescopes



Simulated CMS Higgs event

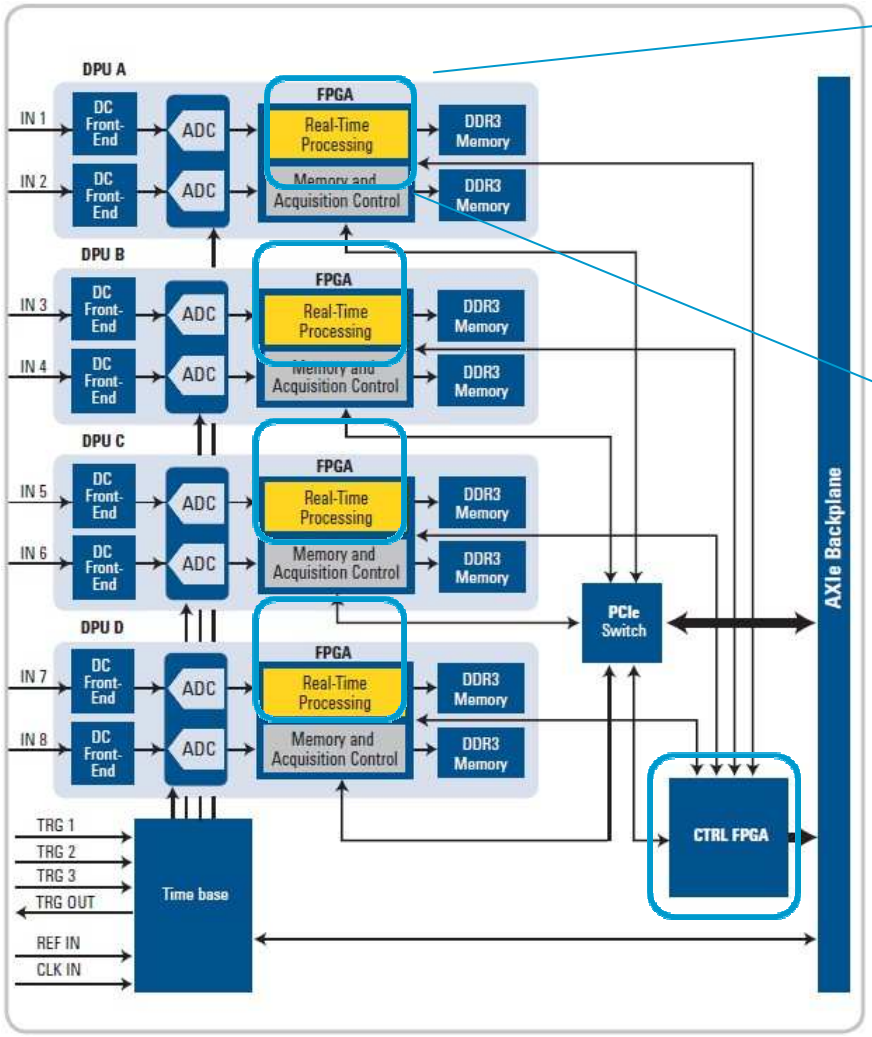
AXIe High-Speed Digitizers

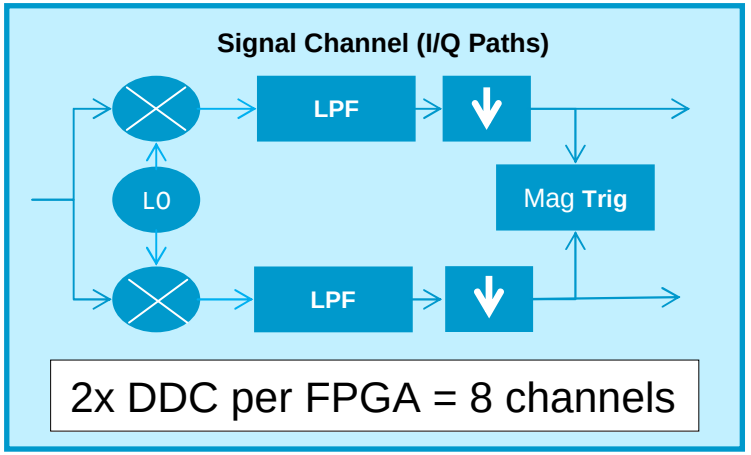
Key Specifications

Description	M9703A
Type	**AXIe High-Speed Digitizer**
Channels	8 - 4
Sampling Rate	1 GS/s-2 GS/s, or 1.6 GS/s-3.2 GS/s
Resolution	12-bit
Bandwidth	DC to 650 MHz, or DC to 2 GHz (1 GHz in interleaved mode)
Input voltage full scale range (FSR)	1 V / 2 V
On-board processing	**Virtex-6 FPGA** for real-time processing
Trigger time resolution	6 ps *(nominal)*
Effective bits (ENOB) at 410 MHz	8.2 (8.9, typical)
Signal-to-noise ratio (SNR) at 410 MHz	54 dB (56 dB, typical)
Channel-to-channel skew stability	± 200 fs pk (nominal) 75 fs RMS (nominal)
Channel-to-channel phase offset stability	**± 0.03° pk (nominal) 0.01° RMS (nominal)**
Power consumption	161 W (20.1 W/ch)

M9703A –DDC Block Diagram

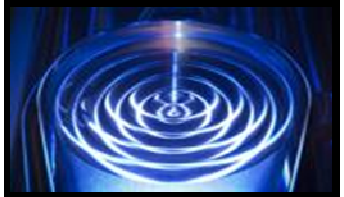
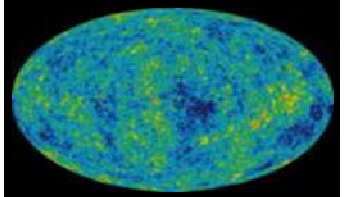
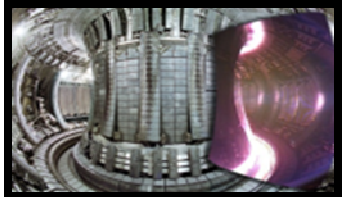
Built-in FPGAs- 4 processing per module





- Agility to tune/zoom, trigger, and analyze only the signal of interest.
- **Independent IF tuning** (0.01Hz) over the full digitizer bandwidth
- **Transfer only the data that you want → reduce the workload on post-processing algorithms**

Physics Applications for M9703A

	Big Physics (Fusion) Inertial confinement	Big Physics (Hydrodynamics) X-Ray imaging	Big Physics (Particle Physics)	Big Physics (µW/RF Astronomy)	Big Physics (Fusion) Tokamak
Requirements	High channel count, Precise timing, high speed, high resolution	High channel count, Precise timing, high speed, high resolution	High channel count, Precise timing, wide bandwidth, high resolution	Precise and stable timing, wide bandwidth, on-board processing, high resolution , high throughput.	High channel count, multi-card synch., high bandwidth, high resolution, high throughput.
					

Achieving Real-Time Measurement Throughput

ENOB
SINAD
SNR
THD
….

Accurate measure-ment

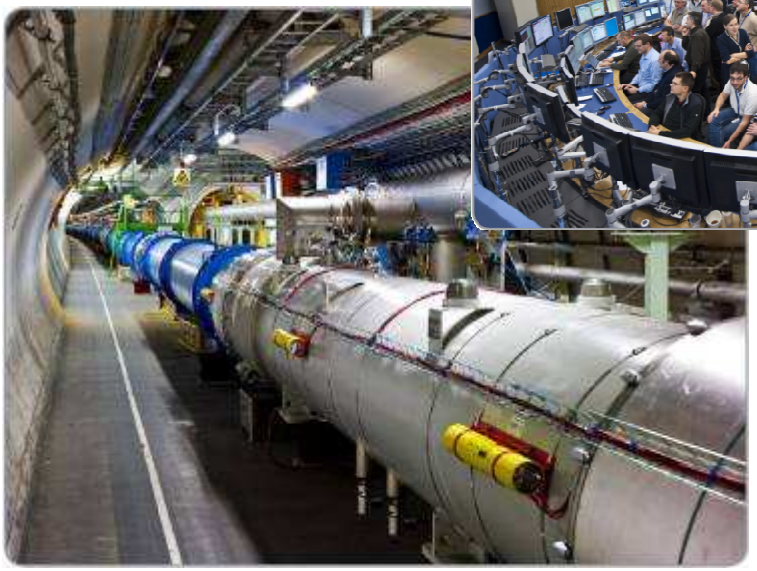
- Beyond banner specs
- Taking all sources of error into account

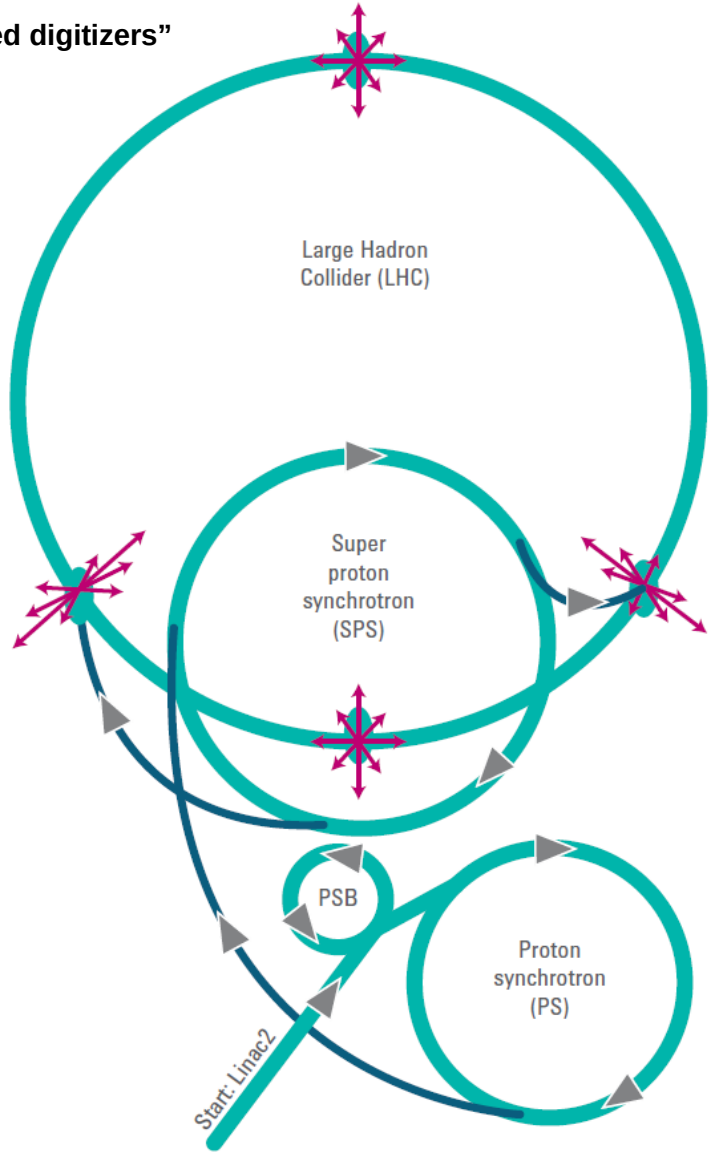
Application 1

Details in “Research Papers: Academic publications on use of Agilent high-speed digitizers”

Particle beam steering at CERN

More than 70 Agilent Acqiris digitizers are installed across all of CERN’s accelerators





Application 2

Details in “Research Papers: Academic publications on use of Agilent high-speed digitizers”

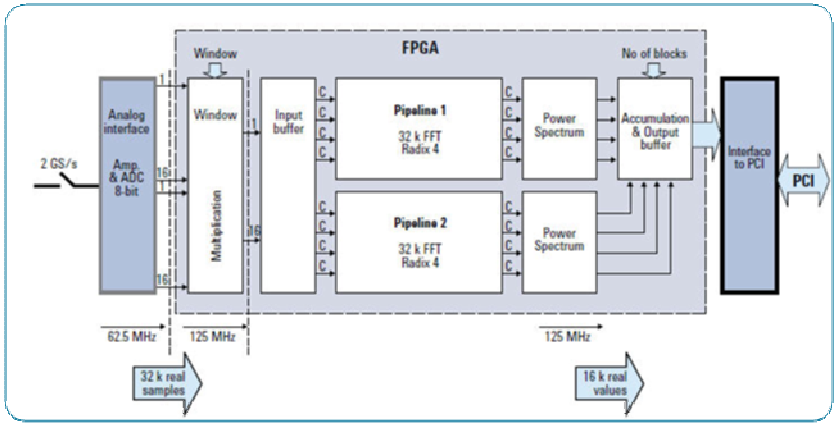
Broadband FFT Spectrometer

Observation of molecular lines in stars a well as comet and planetary atmospheres.

Observation of our own atmosphere for environmental research.

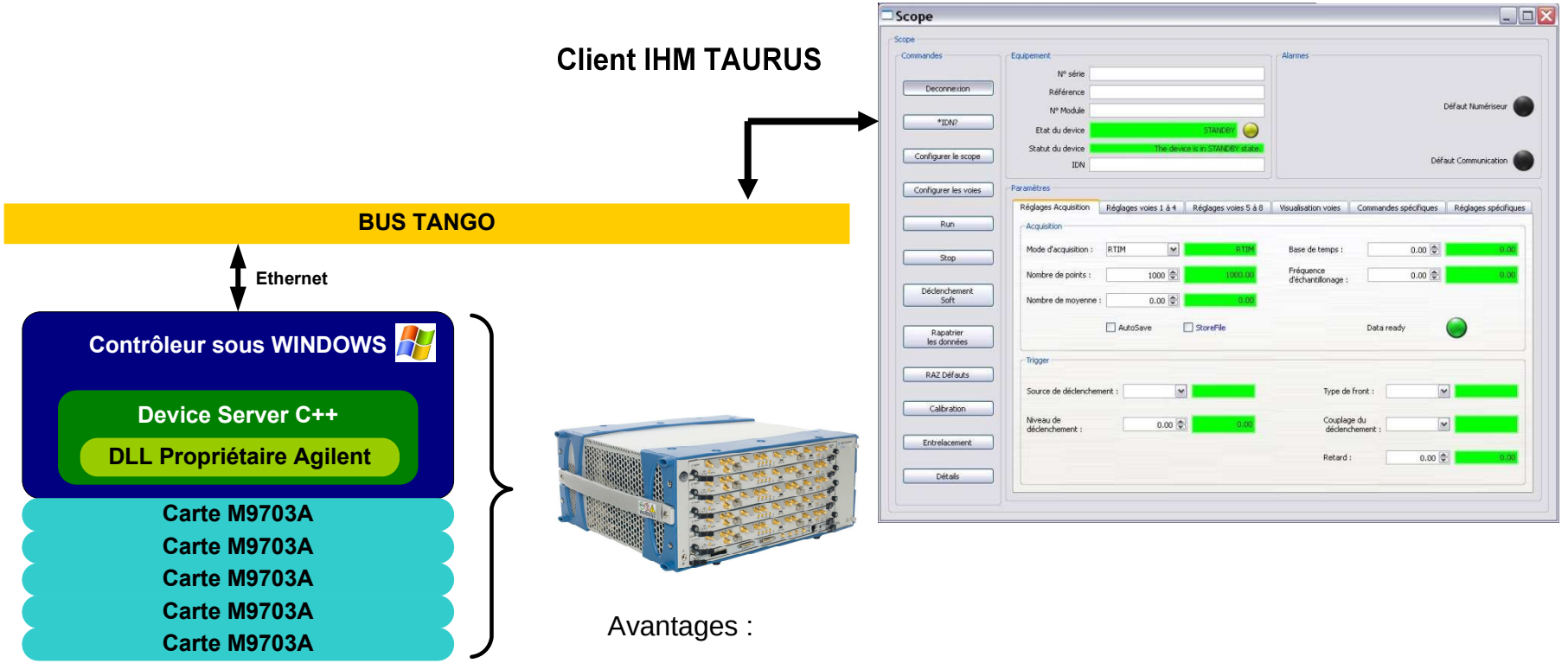
Processing developed in collaboration with ETHZ to run on Agilent digitizer with on-board FPGA creates 16k frequency channel FFT running at 2 GS/s with 1 GHz analog bandwidth.

FFT read out in real-time as 36 bit over PCI bus running at 33 MHz



Exemple de mise en œuvre M9703A + TANGO

Exemple développé par Nexeya Systems pour le CEA:



Avantages :

- Device Server intégré à l'équipement => Equipement Plug and play

Inconvénients:

- DLL de pilotage propriétaire AGILENT TECHNOLOGIES

State-of-the-Art Modular Digitizer Technology

www.agilent.com/find/PhysicsAXIe