FP7 Initial Training Network

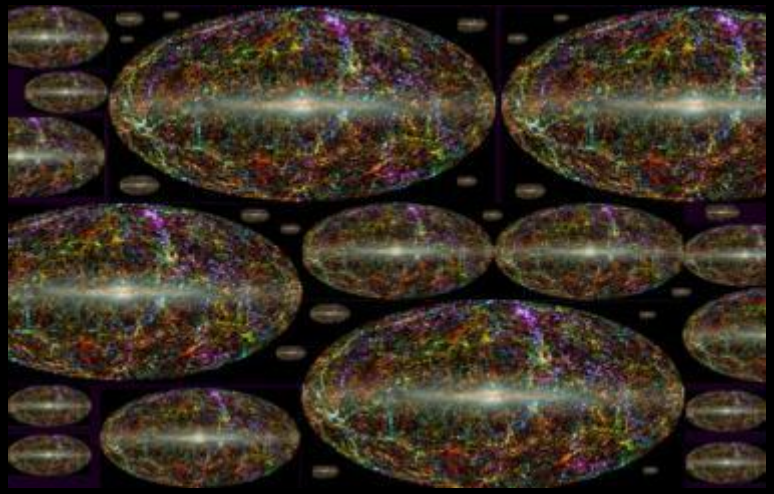
a very brief introduction

Marie Curie Initial Training Networks

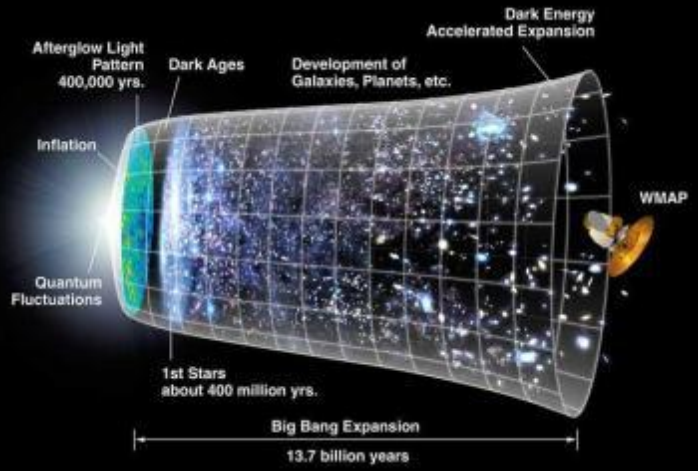
- Primary goal is mobility and training of young researchers
- Mix of academic and industrial partners
- Majority of funding is for PhD studentships around the nodes (with a very small number of postdocs)
- The network also funds collaborative visits, training schools and large meetings.

INtelligent
Fast
Interconnected and efficient devices for frontier
Exploitation in
Research and
Industry

cause *in fieri*



cause *in esse*



INFIERI is a training network in hardware and software in advanced real-time high-speed data processing, based around three academic / industrial science themes.

- Astrophysics (CTA, SKA)
- Particle physics (CMS)
- Medical imaging

Partnership No.	Partnership Name	Country	Industrial Firm	Legal Entity Names	Department/ Division/ Laboratory	Scientist-in Charge
Full network partners (beneficiaries)						
1	Paris –APC Coordinator	FR		Université Paris Diderot (Paris 7)	Astroparticule et Cosmologie (APC)	Dr. Aurore SAVOY-NAVARRO
				Université de Lyon	INL (Lyon Inst. of Nanotechnology)	
2	FOM-NIKHEF	NL		Nationaal Instituut voor subatomaire fysica	FOM-NIKHEF	Dr. Nigel HESSEY
3	Lisbon	PT		Laboratório Instrumentação e Fisica Experimental de Particulas (LIP)	Lisbon	Prof. Joao VARELA
4	INFN-Pi-SI	IT		Istituto Nazionale di Fisica Nucleare (INFN)	INFN Sezione di Pisa e Gruppo Collegato INFN di Siena	Dr. Fabrizio PALLA
5	Madrid	SP		Universidad Carlos III de Madrid (*UC3M*)	Department of Bioengineering and Aerospace Engineering	Prof. Juan José VAQUERO
6	CTA-UK	UK		Leicester University	Departments of Physics & Astronomy	Prof. Jim HINTON
				Liverpool University		
				Oxford University		
7	RAL/Bristol U.	UK		Rutherford Appleton Laboratory Harwell Science and Innovation Campus	STFC	Dr. Claire SHEPHERD-THEMISTOCLEOUS
				BRISTOL University	Particle Physics Department	
8	Sant'Anna	IT		Scuola Superiore Sant'Anna	Institute of Communication Information and Perceptual Technology (TECIP)	Prof. Giancarlo PRATI
9	THALES	NE	√	THALES SA	THALES Research & Technology (TRT)	Philippe BONNOT
10	PHILIPS	NE	√	PHILIPS SA		Dr Matthias BERTRAM & Dr Maarten Van der Nieuwenhof

Partnership No.	Partnership Name	Country	Industrial Firm	Legal Entity Names	Department/ Division/ Laboratory	Scientist-in Charge
Associated partners						
11	SEOUL	Korea		Seoul National University	Dep. of Physics and Astronomy	Prof. Soo-Bong KIM
12	SAMSUNG	Korea	√	SAMSUNG SAIT	TEC& DEV	InKyeong YOO (Vice-President)
13	FNAL	USA		CMS-FNAL	CMS group & LPC	Dr Joe BUTLER & Prof. Ian SHIPSEY
14	PURDUE University	USA		Purdue University	Physics Department	Prof. Daniela BORTOLETTO
15	TEZZARON	USA	√	TEZZARON SEMICONDUCTOR		Robert PATTI
16	SEDECAL	SP	√	SEDECAL, SA	Preclinical Imaging Division	Jose Maria ORTEGA
17	CAEN	IT	√	CAEN SpA	CAEN SpA	Franco VIVALDI (Vice-President)
18	CERN	CH		CERN	CERN Directorat Scientific Director	Prof. Sergio BERTOLUCCI

WP#	Deliverable No.	Deliverable	Lead Beneficiary (Contributors)*	Milestones/ Month
1	*1.1*	***Pixel based Level1-Trigger (PT)** feasibility study*	*LIP*	12
	1.2/1.3/1.4	*Prototype design/evaluation & tests results*	*(1,3,4, A3, A4, A10)*	36/48
	1.5	***Outer tracker trigger:** feasibility study*	*INFN*	12
	1.6/1.7/1.8	*Prototype design/ evaluation & tests results*	*(1,A3, A8)*	36/48
	1.9	***CTA-Level1-Trigger** feasibility study*	*UOXF*	12
	1.10/1.11	*Prototype design/ prototype tests results*	(1,4,10, A9, A11)	36/48
	1.12	***PET–Level1-Trigger** feasibility study*	*UC3M*	12
	1.13/1.14	*Prototype design/evaluation & tests results*	*(4,10,A6, A7)*	36/48
2		***VDSM 3D demonstrator + TSV O (10)μm diameter***	CNRS	
	2.1	• *Goals of this study & applications*	(A2, A3, A5, A8)	12
	2.2	• *VHDL design simulation & layout*		*24*
	2.3	• *Tests set-up & results*		*48*
		VDSM 3D studies with TSV O (1)μm diameter	CNRS	
	2.4	• *Study goals & applications*	(A2, A3, A5)	*18*
	2.5	• *Design, simulation, studies with advanced kit*		*48*
3	*3.1*	*High speed link system integration*	FOM (A8, A11)	48
	3.2	*Design of OWC*	SSSA	24
	3.3	*OWC system integration*	SSSA	48
	3.4	*Clock & services/monitoring distribution*	CNRS (A8, A11)	24
	3.5	*Evaluation & report test bench for testing links*	FOM (A8, A11)	48
4		***CTA-High Level Processing***	ULIV	
	4.1	*VHDL design + algorithm simulation study*	(1,4,10,11,A9,	18
	4.2/4.3/ 4.4	*FPGA based proto/test bench develop tests results*	A11)	36/36/48
		PET-High Level Processing		
	4.5/4.6	*VHDL design & algorithms development.*	INFN	18/36
	4.7/4.8	*FPGA-proto/Test bench devpt & proto tests results*	(2,5,10,11,A6, A7)	36/48
		HEP- High Level Processing		
	4.9	• *VHDL design and simulation*	STFC	18
	4.10	• *Prototype design & construction*	(2,3,4,8,A3,A4, A8,	36
	4.11	• *Test bench development & tests results*	A10)	36
		Advanced digital processing architectures:	TRT	
	4.12	*VHDL design and feasibility studies*	(1, A1, A2, A3, A8)	24/48
5	*5.1/5.2/5.3/5.4*	***Tools & characterization test bench** for*	ALL	
		• *WP1 /WP2/ WP3 and WP4*	& Associates	48**
	5.5	• *Advanced pattern recognition algorithms*		48**
	5.6	• *Simulation & performance studies*		48**
6		***Integration simulation studies**:*	ALL	
	6.1/ 6.2/ 6.3	*Astrophysics/HEP/Medical*	& Associates	48**
		***Integration test benches for**:*	ALL	
	6.4/6.5/6.6	*Astrophysics/ HEP/ Medical*	& Associates	48**

	Training events, workshops & conferences	Lead Organising Institution	Planned date	Planned venue
1	ITN yearly multimedia-based series of lectures (4 series, one per year)	ALL including associate partners	Each year from Feb to June	ALL
2	ITN Workshops (7)	ALL: the lead organizer will be the hosting Inst.	M6, M12, **M20-22**, M30, M36, M42, M48	OX, MA, **PA** PI, LIS, LIV, AM*
3	ITN International Schools (4) joint event with each 2 ITN workshops	ALL: the lead organizer will be the hosting Inst.	M6, M20, M30, M42	OX, PA, LIS, AM
4	International Schools, Workshops or Conferences where an ITN institution or individual members are part of the organizing committee.	See details in Table 3.2.1	Each Year or 2 years	Scheduled for each event, one year in advance
5	Special Visits: see details in Table 3.2.1	ALL including associate partners	Coupled with ITN workshops (2)	Same as for (2)

**MA=Madrid, OX=Oxford, PA=Paris, PI=Pisa, LIS=Lisbon, LIV=Liverpool, AM=Amsterdam*

EU Seventh Framework Programme (FP7) Marie Curie Initial Training Network (ITN)

INtelligent, Fast, Interconnected and Efficient devices for Frontier Exploitation in Research and Industry (INFIERI)

This project proposes to establish a special training network aiming to use the cutting edge technological advantages of several fields of Physics and Technology to Astrophysics, High Energy Physics (HEP), Medical Physics and Telecommunication research, through the development of intelligent devices and tools. Intelligent devices have embedded ability to deliver in real-time, high level functionalities coming from the elaboration of simpler operations. The embedded intelligence targets fast, efficient, smart, high fault tolerant, high rate data flow handling, real time and very sophisticated data processing that performs detailed analysis and diagnoses.

This Network is intended to be an inter-disciplinary, multi-national initiative to train a generation of young physicists and engineers in the new domain of intelligent and fast devices useful for Astrophysics, Medical and Particle physics, and Telecommunication research.

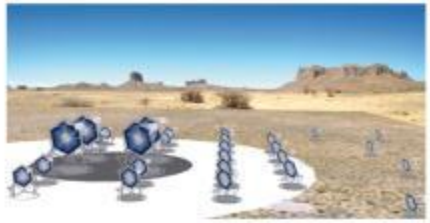
These research fields usually need to handle data at high rates sometime from multiple distributed sources, to perform first an on-site (local, or front-end) data reduction, followed by a fast data transfer to a high capacity tier (the far-end), where further analysis is performed, resulting in high level diagnoses and results, easy to visualize or to interpret. In some cases, the data sources are not directly accessible, or are located in unfriendly environments. The sources can be very close or largely dispersed in space, as for instance an array of pixelated devices assembled into a medical imaging instrument (PET) or an array of Cerenkov detectors spread over kilometers, forming a terrestrial telescope. Although different in size, both cases have very similar needs in terms of treatment of the information.

There are three distinct focused applications around which the training network develops:

- The processing of the detector information for the CTA (Cerenkov Telescope Array) one of the most important project in preparation in Astrophysics.
- The medical imaging based on PET technology compatible with Magnetic Resonance Imaging (MRI).
- The tracking trigger for the CMS experiment at LHC-CERN, in particle Physics.

Cherenkov Telescope Array (CTA)

CTA is an initiative to build the next generation ground-based very-high-energy gamma-ray instrument. The new generation of major astroparticle physics infrastructures will exploit photosensors, fast electronics and advanced telecommunications technology. For example, Silicon-based photomultipliers (SiPMs) are under consideration for CTA and are a feature of new-generation instrumentation in many other fields. The geographical spread of telescopes in CTA and the very large data volume present very significant telecommunications challenges. The time tagging of events and triggering scheme are critical aspects, which share many common aspects with the Particle Physics case. A typical observatory is made by 40-50 telescopes of different sizes with a trigger rate of 1 kHz and a



CTA-UK PhD studentships

- Two fully-funded 3-year studentships to be shared between ULIV, ULEIC, UOXF
- To work on CHEC prototype camera
- Marie Curie rules – student may not be a UK resident; very generous remuneration

In the near and mid term

- The “kick-off” meeting is in Paris 26/27 Sep.
- Next July will be the first full network meeting and summer school in Oxford.

- garret@astro.ox.ac.uk for more details