

APPEC

and

Horizon 2020



Astroparticle Physics for Europe

**Opportunities
for discussion**



S. Katsanevas APPEC

APPEC programs in FP6-FP7

I3 ILIAS
ASPERA

KM3-DS
LAGUNA-DS
LBNO-DS
ET-DS
KM3NET-PP
CTA-PP

MSCA
THEORY
GW-ITN
(+industry)

– Unsuccessful I3: ILIAS-next, HEAPNET 1-2-3



Excellent Science
31,73% i.e. 22,27 B
euros

- A: Marie Skłodowska Curie Actions (MSCA)
- B: Frontier research (ERC)
- C: Research infrastructures (RI)
- D: Future and Emerging Technologies (FET)

1st pillar excellent science

Proposed funding (€ million, 2014-2020)*

<i>European Research Council (ERC)</i> Frontier research by the best individual teams	13 095
<i>Future and Emerging Technologies</i> Collaborative research to open new fields of innovation	2 696
<i>Marie Skłodowska-Curie actions (MSCA)</i> Opportunities for training and career development	6 162
<i>Research infrastructures (including e-infrastructure)</i> Ensuring access to world-class facilities	2 488

* All funding figures in this presentation are subject to the pending Multiannual Financial Framework Regulation by the EP and the Council



Marie Curie Actions, ERC

Network opportunities (community/international networks)

- **MSCA Innovation Training Networks (ITN)**
 - 3 year PHD, 500 person-months
 - Deadline April 2014, Budget 350 ME, success 10%
- **MSCA-COFUND, cofunding of training programs, 3-5 years**
 - National funds 50% / EC 50%
 - Deadline November 2014, Budget 80 ME
- **MSCA-RISE, Global research and innovation staff exchange**
 - Staff exchange with European and non-European countries
 - Deadline Jan 2015, Budget 80 ME, success 60%

Individual opportunities

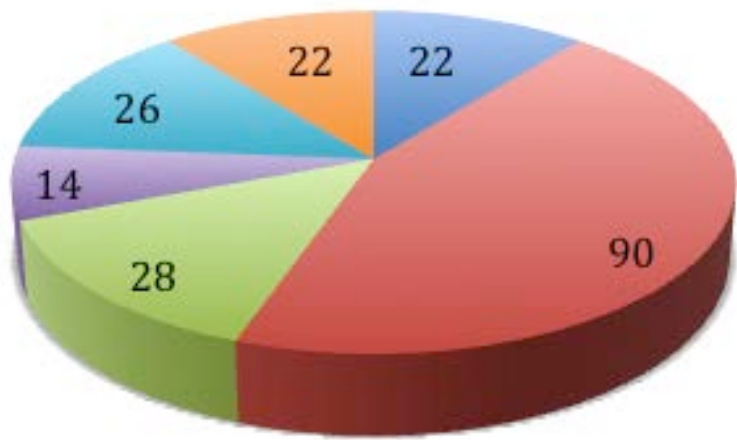
- **MSCA Individual Fellowships (IF)**
 - Deadline April 2014, Budget 350 ME
- **ERC, TOTAL BUDGET €13 billion (currently 15% success)**



A network example: COFUND

An example of a big (90 fellowships) project that has multiple host institutions is CASCADEfellows. The programme is coordinated by the University of Nottingham in the UK and currently involves over 25 international host organisations. Projects last between 12-24 months and fellows are recruited through three open Calls for proposals. <http://cascadefellows.eu/> I think this is what we should be aiming for for PACT. Finally, there are a couple of links for the CERN fellowships: <https://ert.cern.ch/web/COFUND.pdf>

An individual example: ERC (202 P2I projects in first 10 calls)



String Theory, Quantum Gravity, Extra dimensions, Field Theory

Astronomy & Astrophysics

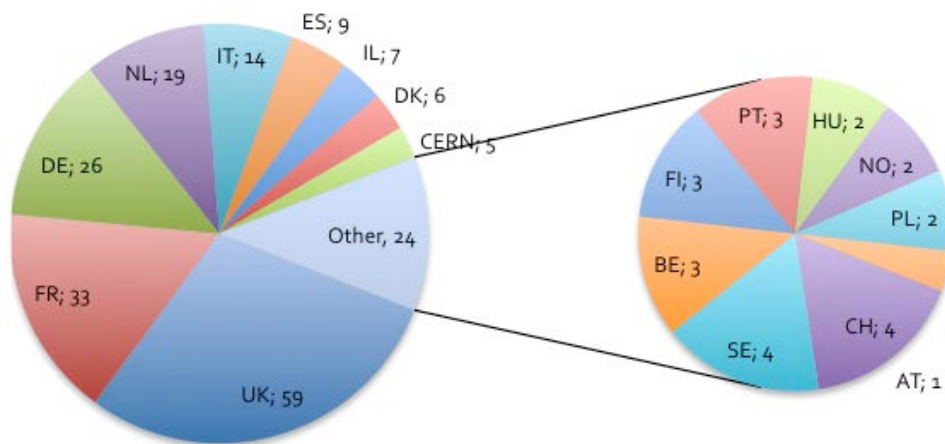
Cosmology

Astroparticle Physics

Particle Physics

Nuclear & Hadron Physics

blue, projects funded under the Advanced Grants scheme are shown in red



Panel	Acronym: full title	Principal Investigator	Host Institution	Host Country	EC funding (k€)
FCM	MANITOP : Massive Neutrinos: Investigating their Theoretical Origin and Phenomenology	Werner Rodejohann	Max Planck Gesellschaft	DE	790,8
	RareNoise : Low-probability, large fluctuations of the noise in detectors of gravitational waves	Livia Conti	Istituto Nazionale di Fisica Nucleare (INFN)	IT	1000
	TREX : Novel Developments in TPCs for Rare Event Searches in Underground Astroparticle Experiments	Igor Garcia Irastorza	Universidad de Zaragoza	ES	1220
	WIMPs KAIROS : The Moment of Truth for WIMP Dark Matter	Gianfranco Bertone	Centre national de la recherche scientifique (CNRS)	FR	1250
	darkfrontier : Fundamental Physics at the Low Background Frontier	Jocelyn Monroe	Royal Holloway and Bedford New College	UK	1060
	neutrinoSNO+ : Probing fundamental properties of the neutrino at the SNO+ Experiment	Jeanne Rachel Wilson	Queen Mary and Westfield College	UK	1350
	SAGNACSPEDMETER : Interferometry beyond the Standard Quantum Limit using a Velocity Sensitive Sagnac Interferometer	Stefan Hild	University of Glasgow	UK	1399
	LUCIFER : Low-background Underground Cryogenic Installation For Elusive Rates	Fernando Ferroni	Istituto Nazionale di Fisica Nucleare (INFN)	IT	3290
	SOX : Short distance neutrino Oscillations with Borexino	Marco Pallavicini	Istituto Nazionale di Fisica Nucleare (INFN)	IT	3452
US	LEAP : Large European Array for Pulsars	Michael Kramer	University of Manchester	UK	2460
	LOFAR-AUGER : From Black Holes to Ultra-High Energy Cosmic Rays: exploring the Extremes of the Universe with Low-Frequency Radio Interferometry	Heino Falcke	Radboud Univ Nijmegen - Stichting Katholieke Universiteit	NL	3460
	CMB : Cosmic ray acceleration, magnetic field and radiation hydrodynamics	Anthony Raymond Bell	University of Oxford	UK	900
	DARK : Dark Matters	Joseph Ivor Silk	Universite Pierre et Marie Curie	FR	2500
INTER DISCIPLINARY	NewDark : New Directions in Dark Matter Phenomenology at the TeV scale	Marco Cirelli	Centre national de la recherche scientifique (CNRS)	FR	1462
TOTAL FUNDING					25593,8

Research Infrastructures

- **B1 Call 1 - Developing new world-class research infrastructures**
 - **INFRADEV 1-2014: Design Studies (15 ME)**
 - 1-3 ME, September 2014
 - **INFRADEV 2-2015: Preparatory Phase of ESFRI projects (14 ME)**
 - New RI (after update of ESFRI Roadmap, 2016) 5 ME
 - Extra funds to existing PP (up to 2 ME)
 - January 2015
 - **INFRADEV 3-2015: Individual implementation and operation of ESFRI projects (90 ME)**
 - Based on ESFRI prioritisation, up to 15 ME, January 2015
 - **INFRADEV 4-2014/2015: Solutions for clusters of ESFRI and other relevant research infrastructure initiatives (55 ME 2014, 25 ME 2015)**
 - 6-15 ME, September 2014

Call 1 - Developing new world class RI

1. Individual implementation and operation of ESFRI projects- deadline January 2015
 1. Based on ESFRI Prioritisation; support for central coordination, operation, access, enlargement of membership, training and innovation activities; may include initial running central coordination office, development innovative components, user access, data management, interoperability, standardisation, outreach, training and international cooperation; support up to 15 Mln EUR
2. Implementation and operation cross-cutting services and Clusters of ESFRI and other research infrastructures initiatives- centred and build around ESFRI projects in thematic areas- OWCRI, e-IR and IA should be involved- support between 6-15 Mln EUR- deadline



B2 Call 2 - INFRAIA 1-2014/2015:

I3 for research infrastructures of pan-European interest

- **Physical Sciences - Starting Communities**
 - European laboratory astrophysics.
 - Research infrastructures for high-energy astrophysics.
 - Science at deep-underground laboratories.
 - Integrating gravitational wave research.
- **Physical Sciences - Advanced Communities**
 - Detectors for future accelerators.
 - Research infrastructures for nuclear physics.
 - European planetary science.

→ Starting communities , up to 5 ME, September 2014

→ Advanced Communities, up to 10 ME, September 2014

→ Rate of success is 50%

→ 90 ME 2014, 50 ME 2015



EXCELLENT SCIENCE: Research Infrastructures

- B3 Call 3 - e-Infrastructures
 - EINFRA 1-2014 – Managing, preserving and computing with big research data
 - September 2014, 55 ME
 - EINFRA 9-2015 – e-Infrastructures for virtual research environments (VRE)
 - January 2015, 42ME



EINFRA 1-2014 MANAGING, PRESERVING AND COMPUTING WITH BIG RESEARCH DATA (50 M)

- 1. Service-driven data e-infrastructures responding to general and specific requirements of researchers and research organisations for open access to and deposit of scientific information.**
- 2. Services to ensure the quality and reliability of the e-infrastructure**, including certification mechanisms for repositories and certification services to test and benchmark capabilities in terms of resilience and service continuity of e-infrastructures;
- 3. Federating institutional and, if possible, private data management and curation tools and services used across or at some point of the full data lifecycle**, including approaches for identification of open data sources and data collected with sensitive or restricted access features.
- 4. Large scale virtualisation of data/compute centre resources** to achieve on-demand compute capacities, improve flexibility for data analysis and avoid unnecessary costly large data transfers.
- 5. Development and adoption of a standards-based computing platform (with open software stack) that can be deployed on different hardware and e-infrastructures** (such as clouds providing infrastructure-as-a-service (IaaS), HPC, grid infrastructures...) to abstract application development and execution from available (possibly remote) computing systems.
- 6. Support to the evolution of EGI (European Grid Infrastructure)**
- 7. Proof of concept and prototypes of data infrastructure-enabling software (e.g. for databases and data mining) for extremely large or highly heterogeneous data sets scaling to zetabytes and trillion of objects.** *Clean slate approaches to data management targeting 2020+ 'data factory' requirements of research communities and large scale facilities (e.g. ESFRI projects) are encouraged*



Specific challenge: There is yet considerable potential and room for development in the use of virtual research environments. The objective is to address this challenge by supporting capacity building in interdisciplinary research communities to empower researchers through development and deployment of service-driven digital research environments, services and tools tailored to their specific needs. These virtual research environments (VRE) should integrate resources across all layers of the e-infrastructure (networking, computing, data, software, user interfaces), should foster cross-disciplinary data interoperability and should provide functions allowing data citation and promoting data sharing and trust.



European
Commission

INTEGRATED e-INFRASTRUCTURE SERVICES

VRE

E-INFRASTRUCTURES FOR
VIRTUAL RESEARCH
ENVIRONMENTS (VRE)

PROVISION OF
CORE SERVICES
ACROSS
E-INFRASTRUCTURES

DATA

COMPUTING

NETWORK OF
HPC COMPETENCE
CENTRES FOR SMES

MANAGING, PRESERVING
AND COMPUTING WITH
BIG RESEARCH DATA

RESEARCH AND
EDUCATION
NETWORKING –
GEANT

CENTRES
OF EXCELLENCE
FOR COMPUTING
APPLICATIONS

E-INFRASTRUCTURES
FOR OPEN ACCESS

CONNECTIVITY

PAN-EUROPEAN
HIGH PERFORMANCE COMPUTING
INFRASTRUCTURE AND SERVICES

TOWARDS GLOBAL DATA
E-INFRASTRUCTURES
RESEARCH DATA ALLIANCE

SUPPORT

E-INFRASTRUCTURE
POLICY DEVELOPMENT AND
INTERNATIONAL
COOPERATION

NEW PROFESSIONS
AND SKILLS
FOR E-INFRASTRUCTURES



RESEARCH INFRASTRUCTURE Work Programme 2014-2015 (DRAFT)

CALL 3 → E-INFRASTRUCTURES

MANAGING,
PRESERVING AND
COMPUTING WITH BIG
RESEARCH DATA

E-INFRASTRUCTURES
FOR OPEN ACCESS

TOWARDS GLOBAL DATA
E-INFRASTRUCTURES:
RESEARCH DATA
ALLIANCE

PAN-EUROPEAN
HIGH PERFORMANCE
COMPUTING INFRASTRUCTURE
AND SERVICES

CENTRES
OF EXCELLENCE
FOR COMPUTING
APPLICATIONS

NETWORK OF
HPC COMPETENCE
CENTRES FOR SMES

PROVISION OF
CORE SERVICES
ACROSS
E-INFRASTRUCTURES

RESEARCH AND
EDUCATION
NETWORKING –
GEANT

E-INFRASTRUCTURES
FOR VIRTUAL RESEARCH
ENVIRONMENTS (VRE)

CALL 4 → SUPPORT TO INNOVATION, HUMAN RESOURCES, POLICY AND INTERNATIONAL COOPERATION FOR RESEARCH INFRASTRUCTURES

In blue:
Appec interest

E-INFRASTRUCTURE
POLICY DEVELOPMENT
AND INTERNATIONAL
COOPERATION

NEW PROFESSIONS
AND SKILLS
FOR E-INFRASTRUCTURES

EXCELLENT SCIENCE: Research Infrastructures

- **B4 Call 4- INFRASUPP 6-2014 – International cooperation for research infrastructures, September 2014, 7 ME**

Scope: In this context, the research infrastructure action will focus its activities on international cooperation in three different but complementary ways, as required: bilaterally with a single third country at policy level; multi-laterally with different third countries, targeting specific research and innovation aspects of research infrastructures of common interest in one area of science and technology; multi-laterally with different third countries if a specific effort is required in the context of a specific world class research infrastructure. Support to activities decided in the context of the Group of Senior officials on Global Research Infrastructures may fall in the latter two categories.

Proposals will address one of the following areas:

- Facilitate the development of global research infrastructures and the cooperation of European RI with their non-European counterparts, ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures, on the basis of the recommendations of the Group of Senior Officials on Global Research Infrastructures;
 - Support bilateral cooperation on research infrastructures with Russia. The proposal will in particular help develop cooperation between European research infrastructures and the Russian Megascience facilities³¹, including the underpinning e-infrastructure.
 - Support multilateral cooperation with European Neighbourhood Policy countries and Western Balkan Countries. The proposal will aim at developing regional roadmaps of research infrastructures jointly with stakeholders and policymakers and help them develop closer cooperation with research infrastructures of pan-European interest through training, data management and trans-national access.



A Research Infrastructures ERANET for APPEC?

- ERA-NET in Horizon2020: Top-up (33%) funding of individual joint calls for transnational research and innovation in selected areas.
- Multiple joints calls in an variable geometry with individual grant agreements for each call Large initiatives with major strategic research agendas might propose a series of call topics for which top-up funding could be provided.
- Unresolved question for APPEC, will there be ERANET+ in RI ? Up to now we know only ERANETs associated with the societal challenges (Pillar 3)

Annex 1: Summary table of all planned call budgets (public funding) in Million € from 2004 to 2015

(last update of this table made in September 2013)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	
ERA-NET and ERA-NET Plus														
ACENET/CAPITA	-	-	-	4,50	-	-	-	6,00	7,00	No public data				
AERTOS	-	-	-	-	-	2,49	-	-	2,50	-	-	-	4,99	
AirTN	-	-	-	-	-	-	-	-	36,30	-	-	-	36,30	
AMPERA	-	-	-	3,27	-	-	-	-	-	-	-	-	2,07	
ARIMNet	-	-	-	-	-	-	-	6,00	-	-	-	-	6,00	
ASPERA	-	-	-	-	-	3,36	3,08	-	1,27	-	1 call CF	-	7,70	
ASTRONET	-	-	-	-	3,15	-	-	-	-	-	-	-	3,15	
BIODIVERSA	-	-	-	-	14,20	-	-	9,62	8,84	9,00	9,00	1 call	50,66	
BIOENERGY	-	-	1,67	3,33	2,20	5,91	19,00	18,50	4,30	50,60	31,00	1 call	36,51	
BONUS	-	-	-	22,02	-	-	-	-	-	-	-	-	22,02	
BS-ERA.NET	-	-	-	-	-	-	-	3,50	-	-	-	-	3,50	
CHIST-ERA	-	-	-	-	-	-	10,00	-	11,40	10,00	1 call	1 call	31,40	
CIRCLE	-	-	-	2,55	-	-	2,12	-	-	1 call	-	-	4,67	

CF : The network plans to use Co-Fund ERA-NET under H2020

From report written by the members of the Joint Programming Unit

Contact: Jörg Niehoff
joerg.niehoff@ec.europa.eu
DG Research & Innovation
Unit B4 - Joint Programming

EXCELLENT SCIENCE:

C. Future Emerging technologies (FET)

- **Open:**
 - Short programs funded on aggressive R&D with industrial application 80 ME/year
 - **Proactive 9 themes 60-82 ME/year**
 - Understanding time for new technologies 20 ME
 - Symbiosis between artificial and natural systems 25 ME
 - Adaptive bottom-up construction 35 ME
 - New possibilities at the nano-bio-chem interface 25 ME
 - Knowing, doing and being: Cognition beyond problem solving 35 ME
 - Ecological ubiquitous technology 25 ME
 - Exploiting light-matter interaction 20 ME
 - Quantum simulation and networking 30 ME
 - Global Systems Science 20 ME
 - CSA 2,3 ME
 - **Flagships**
 - Graphène
 - Humain Brain Project
 - **Computer Science, towards hexascale**
 - HPC workloads 20 ME
- APPEC interests, can we map them to FET ?
- Sensor networks in hostile environments
 - Low radioactivity tracing
 - Photonics
 - Photodetectors (large area, small pixels)
 - Extreme photonics (lasers/mirrors)
 - Cryogenic detectors (MKIDs, TES)
 - Materials of extreme radiopurity
 - Space



Industrial Leadership 22,09% i.e. 15,51 B euros

A. Leadership in enabling and industrial technologies:

ICT; Nanotechnologies; Advanced Materials; Biotechnology; Advanced Manufacturing and Processing; and **Space**

B. Access to risk finance

C. Innovation in Small and Medium-Sized Enterprises (SMEs)

INDUSTRIAL LEADERSHIP: LEIT ICT

- **1.A.1 ICT Challenge 1 - A new generation of components and systems**
 - **1.A.1.3 Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies**
- **1.A.2 ICT Challenge 2 - Advanced Computing**
 - **1.A.2.1 Customised and low power computing**
- **1.A.3 ICT Challenge 3 - Future Internet**
 - **1.A.3.1 Smart Networks and novel Internet Architectures**
 - **1.A.3.2 Smart optical and wireless network technologies**
 - **1.A.3.3 Advanced Cloud Infrastructures and Services**
 - **1.A.3.5 Tools and Methods for Software Development**
 - **1.A.3.7 FIRE+ (Future Internet Research & Experimentation)**
- **1.A.4 ICT Challenge 4 - Content technologies and information management**
 - **1.A.4.1 Big Data Innovation and take-up**
 - **1.A.4.2 Big Data - research**
- **1.A.5 ICT Challenge 5 - Robotics**
 - **1.A.5.1 Roadmap-based R&D&I in Robotics**
- **1.A.6 ICT Challenge 6 - Micro- and nano-electronic technologies, Photonics**
 - **1.A.6.2 Photonics KET 2014**
 - **1.A.6.3 Photonics KET 2015**
- **1.A.8 ICT Cross-Cutting and Horizontal Activities**
 - **1.A.8.1 Internet of Things and Platforms for Connected Smart Objects**

INDUSTRIAL LEADERSHIP: A. LEIT Space

- **2.1.7.A.2 Call “Earth Observation”**
 - **Objective 1 – Space enabled Applications**
 - **Topic A – New ideas for Earth-relevant space applications**
- **2.1.7.A.3 Call “Competitiveness of the European Space Sector”**
 - **Objective 1 - Protection of European Assets in and from Space**
 - **Topic A – Space Weather**
 - **Objective 5 – Outreach and Communication**
 - **Topic A – Global outreach through education**
 - **Topic B – European outreach through education**
- **2.1.7.A.5 Call “Competitiveness of the European Space Sector”**
 - **Objective 3 - Space Science**
 - **Topic A – Scientific exploitation of astrophysics data**



Societal Challenges 38,53% i.e. 27,05B euros

- ① HEALTH
- ② FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY
- ③ ENERGY
- ④ TRANSPORT
- ⑤ CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS
- ⑥ INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES
- ⑦ SECURE SOCIETIES CHALLENGE

Working group checklist

1. Will we do a MSCA and of which type ? (ITN, COFUND,RISE) and which perimeter ?
2. Can we propose a Design Study ?
3. Is there a present/future ESFRI link ? PP?, Implementation ?
4. Can we propose an I3 beyond GW, UL
5. Can we participate in an RI cluster ?
6. Can we bid to an e-infrastructure ? (calls 1 and 9)
7. Can we participate in a FET open ?
8. What are the global aspects of our research ?
9. What are the R&D themes that an ERANET+ could support ?
10. Can we apply for FET's, LEITs, societal challenge R&D ?