Enclosure 2

Letter of Request
presented to the
Ministry of Science, Technology and Innovation in Brazil

Request for support to the

Progetto Brazilian Science Data Center (BSDC)

Director
João Braga
INPE and ICRANet

Presented by

International Center for Relativistic Astrophysics Network

(ICRANet)

March, 2013

Presentation: Starting by the official entry of Brazil in ICRANet, a series of investigations have been performed to identify opportunities and means of supporting the rapid development of astrophysics, cosmology and space research in Brazil on an ongoing basis. The results of these efforts have resulted in the following actions:

1. **ACTIONS PERFORMED**

1.1 Creation by ICRANet of the “International Relativistic Astrophysics Doctoral program” (IRAP-PhD), in collaboration with AEI – Albert Einstein Institute – Potsdam (Germany), Berlin Free University (Germany), CBPF – Brazilian Centre for Physics Research (Brazil), ETH – Zurich (Switzerland), Ferrara University (Italy), IHES (France), Indian centre for space physics (India), Nice University Sophia Antipolis (France), Observatory of the Côte d'Azur (France), Rome University – “Sapienza” (Italy), Savoie University (France), Shanghai Astronomical Observatory (China), Stockholm University (Sweden), Tartu Observatory (Estonia); grant of post-graduation fellowships in astrophysics and cosmology to Brazilian students; grant for advanced internship at ICRANet in Pescara and in other European research centers; promotion of workshops and seminars in Brazil and support for meetings between Brazilian scientists and scientists coming from advanced centers for research; these objectives are being developed.

1.2 Cooperation agreements with the following Brazilian research and training institutions: Centro Brasileiro de Pesquisas Fisicas (CBPF), Instituto Nacional de Pesquisa Espacial (INPE), S. José dos Campos, S.Paulo; Instituto Tecnologico da Aeronautica, (ITA), S. José dos Campos, S. Paulo, Universidade do Estado do Rio de Janeiro (UERJ); realizing in this way a wide and continuous scientific collaboration in the fields of Astrophysics, cosmology and similar disciplines, and the use of its premises in the Seat of Rio de Janeiro for the temporary location of ICRANet office in Brazil; meanwhile there are other ones which are being evaluated: Universidade Federal da Paraiba, Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ), Coordenação de Aperfeiçoamento do Pessoal de Nivel Superior (Capes).

1.3 Following the agreement signed with the Government of the State of Ceará, it has been organized a meeting in Fortaleza from May 22 to 26, 2009, which is called “The sun, the stars, the Universe and General Relativity” (Sobral 90). During this event original works in the field of astrophysics and cosmology have been presented with the participation of scientists from many Countries. Proceedings of this meeting have been published by Cambridge Scientific Publisher; it is being planned to have an annual meeting in Rio de Janeiro dedicated to relativistic astrophysics within the Cesare Lattes Program.

2. **PERMANENT ACTIONS**

2.1 The Seat of ICRANet in Rio de Janeiro has been activated, at first in the premises granted by CBPF (see Attachment 1); the possible expansion development to the Cassino da Urca; it has been planned the development of an annual meeting in Rio de Janeiro within the Cesare Lattes Program and dedicated to relativistic astrophysics (see above). It is planned a school of Cosmology and Astrophysics which can initially act in the premises at the CBPF in Rio de Janeiro, with the aim to offer an advanced education in astrophysics, cosmology and in the pertinent fields, and to promote a continuous program of refresher courses for Brazilian and South-American scientists.

2.2 With the help of FAPERJ and CAPES a development of the Cesare Lattes Program is planned and it will include: a) the exchange of ICRANet researchers for activities to be developed at ICRANet Rio and in the centers which have signed cooperation agreements in Brazil; b) the offer to Brazilian professors to spend periods of research at one of the ICRANet Seats; c) grant of annual scholarships to 20 graduate students within the IRAP PhD.

2.3 the development of the Brazilian Science Data Center (BSDC), which has been already operative at the seat in Rio de Janeiro (see details in the present document).

3. **INSTITUTIONAL ACTIONS**

3.1 All necessary actions with the Ministry of External Relations have been taken in order to sign the Seat Agreement for the Seat ICRANet-Rio;

4. **PROJECT OF BRAZILIAN SCIENCE DATA CENTER**

4.1 The present document has been created thanks to the collaboration of Prof. Carlo Luciano Bianco (ICRANet), João Braga (Vice-President of INPE), Paolo Giommi (Director of ASI SCIENCE DATA CENTER ASDC Italy), Mario Novello (CBPF) and Remo Ruffini (ICRANet).

4.2 **Introduction:** The development of scientific research in the fields of astrophysics, cosmology and space research has been limited in Brazil, due to the lack of a Data Center able to receive, file, process and make available to the Brazilian scientists the information coming from the stations and laboratories connected to satellites, telescopes and radio-telescopes, as well as to other space stations and other centers of scientific data. For this reason Brazilian scientists and technicians had access to important data with more

difficulty and often late, and this has limited their competitiveness with their colleagues from other Countries, who on the contrary have efficient services, which consent them to have the necessary expertise for an optimal interpretation of data. Modern data centers will also consent to do researches based on big quantity of data, coming from many instruments, a very efficient type of research which could not be possible by individual researcher. It is a problem then, whose solution cannot be postponed.

4.3 **Solution:** ICRANet, in addition to connect theoretical and observational astrophysicists who work on the most important researches, have the collaboration of high qualified technicians who are able to plan and install the Brazilian Data Center and provide assistance during its implementation. Moreover, it avails itself of the support and cooperation of ASI Science Data Center (ASDC), a branch of the Italian Space Agency (ASI) equipped to provide support to the space missions in the fields of astronomy, astrophysics, cosmology, investigation of the solar system and astroparticle physics. A detailed description of ASDC activity, its infrastructure, the amount of data registered, the space missions supported and the services offered to the astronomical community, can be found in the document " The ASI Science Data Center", ADF TN2011-2, here enclosed (Attachment 2).

The main scientific and training activities of ICRANet are included in the three volumes of the Report of the Director to the Scientific Committee here enclosed (Attachment 3 – DVD). The cooperation of ASDC in the project of BSDC started in the phase of the requests for the elaboration of the project BSDC and is currently going on. Among the preliminary activities for the installation of BSDC a series of meetings have been held in Italy with ASDC and in Brazil, at Centro Brasileiro de Pesquisas Fisicas (CBPF in Rio) and Instituto Nacional de Pesquisas Espaciais (INPE in S. José dos Campos), with Brazilian specialists. A series of seminars have been held at CBPF and INPE by the astrophysicist Paolo Giommi, Director of ASDC. The Director of ICRANet, Prof. Remo Ruffini, has kept personal contacts with the Director of CBPF and from there it arose the inclusion of the BSDC project in the partnership signed by the two partner institutions. The cooperation by BSDC will consist in offer technical support, provide the BSDC with public data of all scientific missions, promote the exchange of softwares and offer scientific cooperation.

BSDC will not only represent a source of data and astrophysics information, cosmology and astroparticle which Brazil needs in order to develop as pole of attraction for the scientists who work in these fields. BSDC will represent a tool for a Latin-American integration once its strategic information and its expertise will be made available to the scientists from South America.

BSDC, since the beginning of its activities, will benefit of the participation to international collaborations of high level, which have already started by the ASDC in the field of Virtual Observatory. An example is the current collaboration among ASDC, CfA (Cambridge, USA) and ISDC (Ginevra, Switzerland) for the realization of advanced tools (IRIS and ASDC-

SED builder) for the management and scientific analysis of multi-frequency data (radio, infrared, optical, X-ray and gamma ray) and multi-temporal data of extragalactic sources.

5. **OBJECTIVES OF BSDC**

5.1 The main objective of BSDC is to provide data of all international space missions existing on the wavelength of X and gamma rays, and later on the whole electromagnetic spectrum, for all the galactic and extragalactic sources of the Universe. A special attention will be paid to the achievement and the complete respect of the levels defined by the International Virtual Observatory Alliance (IVOA). In addition to these specific objectives, BSDC will promote technical seminars, annual workshops and it will assure a plan of scientific divulgation and popularization of science with the aim of the understanding of the universe. The realization of BSDC will take place in two steps: the first one, which consists in the installation as soon as the Ministry of Science and Technology will accept to support the project; the second one will be later implementation.

In order to demonstrate the technical feasibility of the project, in the past months it has been installed a first prototype of the WEB software and of a part of the data archives of the satellites AGILE and Swift in one of the computers located at CBPF in Rio de Janeiro. This experimental site of BSDC is actually reachable at the address bsdc.icranet.org/main.

6. **TECHNICAL ASPECTS. A POSSIBLE INITIAL CONFIGURATION OF BSDC: THE HIGH VALUE HARDWARE AND THE NECESSARY HUMAN PERSONNEL**

6.1 Archive of astronomical data of ASDC which can be reproduced in the BSDC: Brazil will receive copy of a part or total of a set of data and services available in the ASDC, in accordance with the policy of each specific mission, that is:

6.2 Archives in the active missions:

- 6.2.1 Agile (~0.5 TB);
- 6.2.2 Swift (~ 5TB)
- 6.2.3 Fermi (~0.5TB)
- 6.2.4 Chandra (1.4TB) following the negotiation of an agreement with Harvard CfA
- 6.2.5 Herschel (1.0TB)

6.3 Missions that will be soon active:

6.3.1 NusTAR (in phase of scientific calibration check, first public data will be available in 2013)

6.3.2 GAIA (soon operative)

(The magnitude of such archives refers to June 2012. On the base of the current evaluations we estimate that the total volume will increase up to about 1.5TB per year).

6.4 Missions concluded and no more operative (historical archives)

6.4.1 BeppoSAX (1.3) TB

6.4.2 EXOSAT (**<**1GB)

6.4.3 EINSTEIN (**<** 1GB)

6.4.4 ROSAT (**<**1GB)

6.4.5 ASCA (**<**1GB)

7. **IMPORTANT OBSERVATIONS**

7.1 ASDC is supplied with copies of tens of public astronomical catalogs; the majority is of small dimensions, but some of them are of significant volume (for example WISE, NVSS, SDSS).

7.2 Other catalogs are products of ASDC or, in some cases, ASDC is the main site for their publication, such as for catalogs of BeppoSAX, catalogs serendipite sources discovered with the Swift XRT, the AGILE catalogue of the gamma ray sources, the ROXA survey, the Sedentary survey, the Rome-BZcat, many Fermi catalogs, the catalogs of Planck ERCSC and AGN, etc.

7.3 The total dimension of this set of data is approximately 2TB.

8. **WEB SERVICES AND SOFTWARE INSTRUMENTS. INCLUDED SOFTWARES**:

8.1 Interactive multi-mission ASDC archive;

8.2 Builder SED;

8.3 Data Explorer;

8.4 Interactive interface for ASDC catalogs;

8.5 Instruments of visualization and analysis of data online.

9. **SOFTWARE OF THE VIRTUAL OBSERVATORY AND ASDC-BSDC TOOLS**

9.1 ASDC and BSDC will be involved in the full accomplishment of the level defined by the Virtual Observatory (VO). ASDC is acting with significant efforts toward this aim of the development of the software VO and it is actively cooperating with the other international data centers (such as CfA, ESA-ESAC, ISDC, ecc.). In particular the software interfaces that implement the TAP protocol (Table Access Protocol –synchronous version) have been implemented for the access to the ASDC catalogs and the SAMP protocol (Simple Application Messaging Protocol) which consents to the tools based on VO to communicate one with each other.

9.2 Sharing with BSDC the VO software implemented by ASDC will offer:

9.2.1 The adequate software for the access to the data stored in the remote archives, in accordance with the level fixed by IVOA (International Virtual Observatory Alliance), which offers a series of java functions allowing the remote access to the astronomical catalogs by using the Table Access Protocol (TAP).

9.2.2 Software tools necessary to the analysis of the multi-frequency data with the functions compatible with VO (results in the format of tables VO, integrated with other VO instruments).

9.2.3 The software for the connection between interactive catalogs based on the web and on the VO tools.

10. **BSDC PUBLIC DATA WHICH WILL BE ACCESSIBLE TO BSDC**

10.1 In exchange for the set of data, software and infrastructure that ASDC will supply to BSDC, this last one will assure a copy of all public data which will be stored in the BSDC as part of the local activities, such as the set of public data of the Brazilian astronomical missions and of the Earth observatories.

10.2 The list of the set of public data of BSDC will be accessible to ASDC and it will be inserted in the detailed application for the realization of BSDC.

11. **STAFF**

11.1 Basing on the experience of ASDC, the chart of the staff in the initial configuration of BSDC will be composed by: 1 Director, with the responsibility of the direction of the center; a secretary with the functions of general administrator and one system Administrator;

11.2 In addition to this local and permanent staff, scientists and technicians of ASDC will regularly and permanently visit BSDC and offer remote technical assistance from Italy, mainly collaborating for the realization of the site and assuring the alignment with the

server and the set of ASDC data (for an overall engagement equivalent to the one of a full-time worker).

11.3 ICRANet will set up an interface among the BSDC activities and its researchers and professors, two senior scientists, five post-doc and graduate students of the IRAP PhD Program in order to develop the scientific research associated to the data flow coming from BSDC.

11.4 ICRANet activities will be developed within the Cesare Lattes Program, approved by the Scientific Committee of ICRANet on 15th December 2010 and by the ICRANet Board (see Attachments 4 and 5). The Cesare Lattes Program will be activated with the collaboration of FAPERJ and of the Program " Ciência sem fronteiras".

12. **COSTS**

12.1 The budget necessary to set up the BSDC and guarantee its operation during the first year is summarized in the following outline:

STAFF	**NUMBER**	**COSTS IN EURO (PER YEAR)**
Director of BSDC	1	€ 90.000,00
Secretary	1	Paid by ICRANet
System Administrator	1	€ 40.000,00
Travel expenses	---	€ 25.000,00
Hardware and its implementation	---	€ 80.000,00
Assistance staff and configuration	---	€ 65.000,00
TOTAL		**€ 300.000,00**

13. **REQUEST TO THE MINISTRY OF SCIENCE AND TECHNOLOGY FOR ANNUAL SUPPORT FOR A 5-YEARS PERIOD**

13.1 A project of this magnitude and complexity could not be activated without the financial and institutional support of Brazil, a support that we here recall, leaving to the Minister of Science and Technology to freely establish, after an analysis of this document, the financial support to be assigned.

14. **MOTIVATION**

14.1 The installation of a Data Center in Brazil is an essential requirement for the development of the theoretical and observational astrophysics, as well as for the space research, which is an activity of strategic importance for Brazil which is running toward this aim. This project has been developed with the purpose of achieving this goal in a planned way and with a significant decrease of costs, considering the terms given by ICRANet about involving the essential partnership with the Italian Space Agency (ASI) and supply, through its scientists and those of the affiliated institutions, the needed scientific and technical assistance. The division in two steps of the implementation of BSDC can be done exactly thanks to this peculiarity. We are certainly facing an uncommon and happy opportunity which cannot be ignored avoiding to damage the development of Brazilian astrophysics, cosmology and space research.

Rio de Janeiro,-------- March 2013

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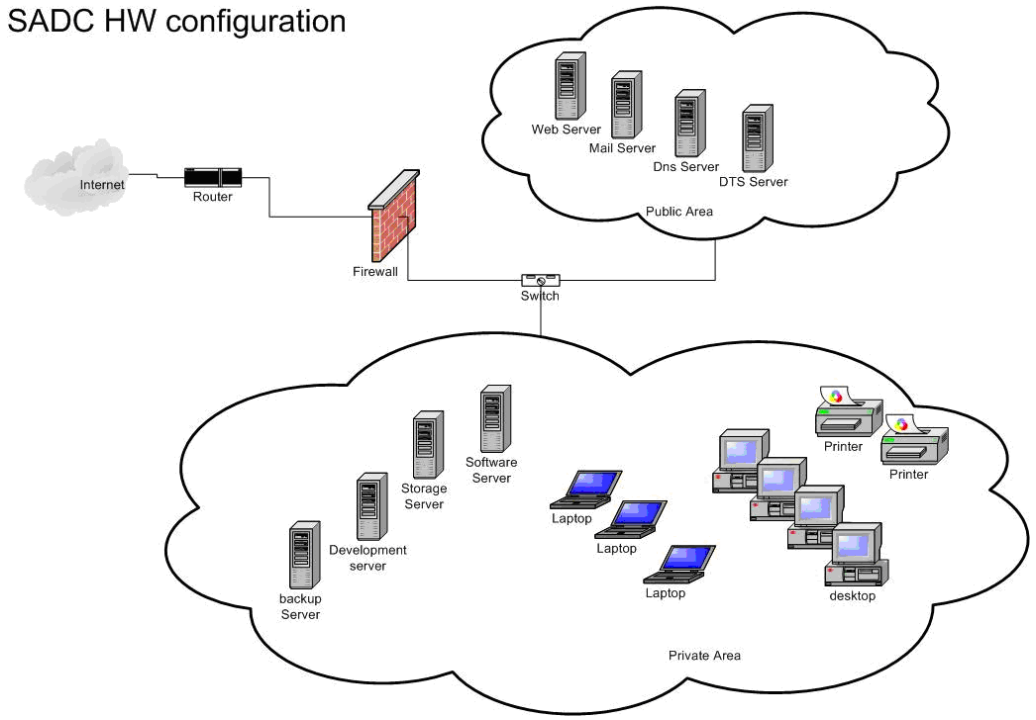
Prof. Remo Ruffini
Director of ICRANet

PROJECT BRAZILIAN SCIENCE DATA CENTER

ANNEX:

Hardware Infrastructure of BSDC

Based on the experience of ASDC we can present a possible configuration for the hardware BSDC in the following figure:



We indicate here below a preliminary list of BSDC hardware required for the implementation of the proposed configuration:

1 server used as archive with the capacity of 20 TB

1 back up server

1 web server

1 mail-DNS-DHCP-DTS server

1 work station for each one of the local users and for a medium number of visitors

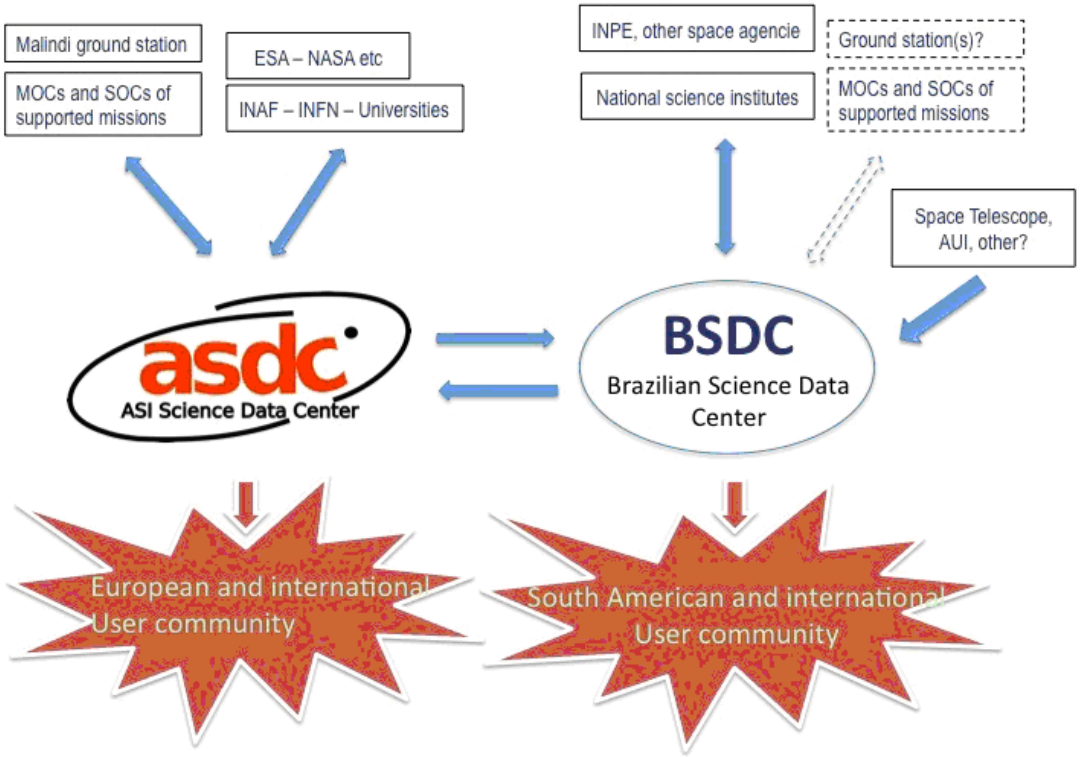
1 firewall

1 high-performance machine dedicated to scientific applications

Various materials , including switches, routers, printers, etc.

Interactions ADC-BSDC

A high level draft showing how BSDC should act and interact with ASDC and other



institutions is showed here below:

ASDC has its base in Frascati, Italy, is funded by the Italian Space Agency (ASI) and is dedicated to serve the national, European and international scientific community; it works in accordance with the agreements with the Italian institutions, NASA, ESA and other agencies. The ASDC receives scientists coming from the National Institute of Astrophysics (INAF) and the National Institute of Nuclear Physics (INFN). It is connected with the Italian Earth Station in Malindi (Kenya) and with the Mission Operation Centers (MOCs) and Science Operation Centers (SOC) of a number of space missions.

During the first phase the BSDC will be located in the ICRANet Center at CBPF. It will be later moved to the ICRANet Center in the Cassino da Urca. Its services will be mainly addressed to the Brazilian, South-American scientific community of Brazil, South America and International community; agreements with national and international agencies will be signed in order to support its activity.

The two centers will be connected through safe communication channels (such as internet and dedicated lines) to ensure that collected data will be adequately protected.

1. SCIENTIFIC COOPERATION AMONG ICRANet, INPE, ASI, ASDC e BSDC

In view of the developments of BSDC and of the collaboration between Italy and Brazil in Space Missions, it has been developed a specific collaboration agreement between INPE and ICRANet, which will be signed on March 14th 2013. A similar agreement has been proposed for the signature between ICRANet and ASI. Considering all these activities it would be appropriate an update of the collaboration agreement between ASI and the Brazilian Space Agency (AEB).

The main objective is promoting a strong interaction among scientists of ICRANet and the team of ASDC and BSDC charged of data acquisition and processing. ICRANet will also promote the scientific research activities of the ASDC staff, deeply involved in the research activities connected to the missions and to the data stored in its electronic archives.

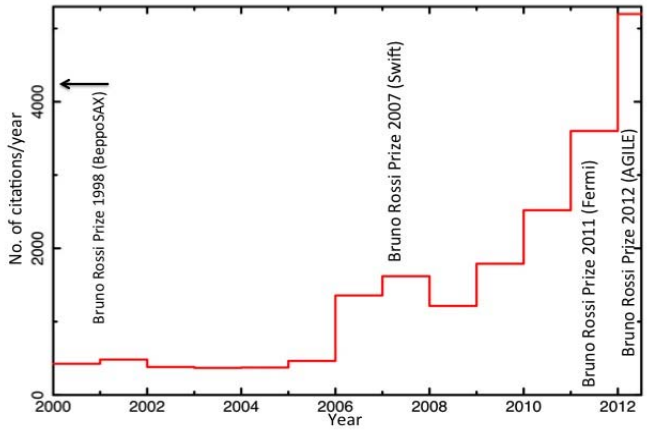
This will lead to a better use of the data archives of both institutions and, on the other hand, to better services for the global community of users.

2. SUCCESS OF ASDC WITH MISSION BeppoSAX, Swift, Fermi, AGILE e NuSTAR

Among all possible scientific activities the one of the Space Observatories it has been for sure one of the most productive, considering the huge amount of publications and the relevant scientific progress that it generates.

ASDC has actively and strongly participated in this process, advancing with the analysis of the data coming from all above-mentioned missions and sharing the co-publishing in all publications of each specific mission.

It was thus that the presence dell'ASDC in scientific publications has grown in line with the number of missions, as shown in the following figure.



In particular, the relevant improvements are registered after the launch of Swift (Nov 2004), AGILE (Apr 2007) and Fermi (Jun 2008).

The participation ASDC has been so relevant, not only for the analysis of the data, but also in the promotion of scientific success of each mission, that four successive awards "Bruno Rossi" by the American Astronomical Society were given to the staff of the ASDC: in 1998 as part of the BeppoSAX team, in 2007 as part of the Swift team, in 2011 as part of the Fermi team, and in 2012 as part of the team of AGILE. Recently (June 2012), NuSTAR mission was launched successfully. As part of the scientific team NuSTAR, the ASDC is responsible for the development and maintenance of the software for the reduction of official data.

Stampa riepilogo

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Numero di catalogo / Descrizione	Codice prodotto	Qty	SKU	Id
Base: PowerEdge R815 Rack Chassis, Up to 6x 2.5" HDDs	392755	1	[210-31846]	1
Processore aggiuntivo: 2x AMD Opteron 6380, 16C, 2.5GHz, 16M L2/16M L3 Cache, Turbo CORE, 115W TDP, DDR3-1600MHz	772563	1	[374-BBBU] [412-AAAK] [412-AAAK]	2
Processore: 2x AMD Opteron 6380, 16C, 2.5GHz, 16M L2/16M L3 Cache, Turbo CORE, 115W TDP, DDR3-1600MHz	772392	1	[338-BBEZ] [412-AAAK] [412-AAAK]	146
Memoria: 512GB Memory for 4 CPUs, DDR3, 1333MHz (16x32GB Quad Ranked LV RDIMMs)	745041	1	[370-23281]	3
Sistema operativo preinstallato: No Operating System	8007	1	[611-10036]	285
Alimentatore: Power Supply, Redundant (2 PSU), 1100W	392816	1	[450-14999]	1015
Configurazione dei dischi rigidi: C5 - R1/R5 for PERC H700, 2 Primary + 3-4 Additional HDDs	392823	1	[780-12325]	1009
Scheda controller RAID o SCSI principale: PERC H700 Integrated RAID Controller, 1GB NV Cache	443472	1	[405-11651]	278
Primo disco rigido: 300GB, SAS 6Gbps, 2.5-in, 15K RPM Hard Drive (Hot-plug)	655424	2	[400-24162]	1209
Disco rigido aggiuntivo: 1.2TB 10K RPM SAS 6Gbps 2.5in Hot-plug Additional Hard Drive	777860	4	[401-AAAN]	217
Cavo di alimentazione: 2x Rack Power Cord 2M (C13/C14 12A)	209465	1	[450-12466] [450-12466]	207
Schede di gestione server: iDRAC6 Enterprise Server Management Card with VFlash, 8GB SD Card	434421	1	[565-10339]	1314

Scheda controller aggiuntiva: PERC H800 RAID Adapter for External JBOD, 1GB NV Cache, PCIe	432637	1	[405-11554]	1204
Schede di rete: Broadcom NetXtreme II 57711 Dual Port SFP+ DA 10GbE NIC with TOE and iSCSI Offload, PCIe-8	356819	1	[540-10732]	1230
Pannello frontale: R815 Rack Bezel	385016	1	[350-10755]	669
Guide di montaggio su rack: Sliding Ready Rack Rails with Cable Management Arm	385006	1	[770-11042]	88
Dispositivi ottici: 8X DVD-ROM Drive SATA	319404	1	[429-14712]	16
BIOS Settings: Active Power Controller BIOS Setting	397016	1	[223-10229]	1318
Etichettatura aggiuntiva sulla confezione: Etich. imb. sped. conf. ord. (n. ord. acq., data sp., mod., velocità proc., cap. disco rigido, RAM)	691677	1	[293-10049]	1040
Gestione dei sistemi: Electronic System Documentation and Dell OpenManage DVD for PowerEdge R815	421300	1	[631-10628]	49
Documenti di spedizione: R815 EMEA1 Ship Docs No Power Cord (English/French/German/Spanish/Russian /Hebrew)	392756	1	[340-21912]	21
Informazioni sull'ordine: PowerEdge Order - Italy	32390	1	[800-10506]	111
Garanzia di base: 3Yr Basic Warranty - Next Business Day - Minimum Warranty	418498	1	[709-10715] [709-10717]	29
Servizi di supporto: 3Yr ProSupport and Next Business Day On-Site Service	418512	1	[710-21051]	30
Servizi Dell: Installazione: No Installation Service Selected (Contact Sales rep for more details)	58267	1	[683-11870]	1290
Servizi di consulenza remota: INFORMAZIONI consulenza remota rifiutata	691639	1	[715-10838]	735
Servizi di manutenzione proattiva: Declined Proactive Maintenance	135789	1	[713-10026]	140

Stampa

Stampa riepilogo

Dell PowerVault MD3260

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Numero di catalogo / Descrizione	Codice prodotto	Qty	SKU	Id
Base: PowerVault MD3260, 6G SAS, 4U-60 drive dense array, Dual 4G Cache Controller	815837	1	[210-ABIM] [403-BBDD]	1
Dischi rigidi: 1.2TB 10K RPM SAS 6Gbps 2.5in Hot-plug Hard Drive	780828	60	[400-AAIZ]	1570
Cavi di alimentazione: Power Cord, C20 to C19, PDU Style,16A, 250V, 2ft (0.6m)	406041	2	[450-18636]	1621
Cavi: 2 x 0.6M SAS Connector External Cable	748509	1	[470-11670] [470-11670]	1624
Accessori per server: Information sku - 1 to 4 Hosts	421216	1	[800-12908]	1630
Licenze: No Additional Software	406063	1	[627-14311]	1651
Spedizione: MD3X60X EMEA1	406039	1	[340-30162]	1500
Informazioni sull'ordine: PowerVault Order - Italy	32411	1	[800-10486]	111
Garanzia di base: 3 Yr Parts Only Minimum Warranty	715357	1	[709-11303] [709-11304]	29
Servizi di supporto: 3Yr ProSupport and Next Business Day Onsite Service	715372	1	[710-37747]	30
Documentazione aggiuntiva: No Installation Service Selected (Contact Sales rep for more details)	57261	1	[683-11930]	1290
Servizio di manutenzione di PowerVault: Declined Proactive Maintenance	138704	1	[713-10066]	142

Stampa


Ruy Garcia Marques
(Presidente FAPERJ)

1. **FAPERJ-ICRANet Postdoctoral Program:**

Four two-year postdoctoral positions each year to make research in universities and research centers from the State of Rio de Janeiro that have signed collaboration agreements with ICRANet and/or with associated scientists to ICRANet. One two-year postdoctoral position to make research in ICRANet Centers in Europe and Asia will be granted. All topics related to theoretical and observational activities and/or data analysis in relativistic astrophysics and cosmology are welcome.

2. **FAPERJ-ICRANet Senior Visitors Program to Brazil:**

A visitor program for scientific visits of university professors and research scientists from ICRANet centers in Asia, Europe, and USA to Brazilian universities and research centers in the State of Rio de Janeiro. The program will grant one positions this year of the duration of up to six months.

3. **FAPERJ-ICRANet Visitors Program to Europe:**

A program to promote scientific visits of university professors and research scientists from the State of Rio de Janeiro in ICRANet centers in Europe. The program will grant two positions per year; each one of the duration of up to six months per year.

4. **FAPERJ-ICRANet Meetings:**

The organization of meetings, workshops, and seminars in the areas of relativistic astrophysics and cosmology. To this end an annual budget of 40.000,00 (forty thousand) euro is required.

5. **FAPERJ-ICRANet Program Installation Costs:**

In the ICRANet seat in the state of Rio de Janeiro a work place will be needed for each of the local users and for an average number of visitors. Each work place will include:
-) a personal desk/chair in an office;
-) a personal computer;
-) an high-speed Internet connection;
-) access to local printers;
-) access to local and international scientific digital libraries;
-) access to local high-performance computing facilities.
The total cost for setting up each work place will be about €2.000,00.

Table A: Installation of ICRANet Seat in Rio de Janeiro (una tantum expenditures).			
	n.	**Individual cost**	**Total**
Work places setup (including PC, library, etc.)	10	2.000	20.000
High performance machine for BSDC data analysis	1	25.275	25.275
Storage solution for BSDC data and backup	1	56.734	56.734
Total			**102.009**

Table B: FAPERJ-ICRANet Fellowship Program 2013-2014 based in Rio de Janeiro (per year expenditures) (*)									
		Positions/year	**Duration (years)**	**Duration (months/year)**	**Health System (per year)**	**Extra for Installation**	**Extra for mobility**	**Fellowship per month**	**Total cost per year**
1	Senior Visitor Program from Europe to the state of Rio de Janeiro	1	?	From 1 to 6	X	X	€ 3.055,30	€ 4.749,47	€ 31.552,12
2	Visitor/Sabbatical Program from Rio de Janeiro to Europe	2	?	From 1 to 6	€ 450,00	€ 2.300,00	€ 2.606,18	€ 2.300,00	€ 38.312,40
3	Posdocs in the stare of Rio de Janeiro	4	2	12 a 24	X	X	€ 2.606,18	€ 2.412,13	€ 126.206,96
4	Posdocs from Rio de Janeiro in Europe	1	2	12 a 24	€ 1.080,00	€ 2.100,00	€ 2.606,18	€ 2.100,00	€ 30.986,18
	Joint meetings, workshop and seminars								€ 40.000,00
	Total								**267.057,66**

(*) costs estimated on the basis of the currently ongoing CAPES-ICRANet program

Senior Visitor Program from Europe to the state of Rio de Janeiro: Ugo Moschella (IT)

Visitor/Sabbatical Program from Rio de Janeiro to Europe: Nelson Pinto-Neto (BR), Luis Juracy Rangel Lemos (BR)

Posdocs in the stare of Rio de Janeiro: Kuantay Boshkayev (KZ)+Narek Sahakyan (ARM), Christine Gruber (AT), José Sacahui (GT), Vincenzo Liccardo (IT)

Posdocs from Rio de Janeiro in Europe: Grasiele Batista dos Santos (BR)

Minutes of the Working groups

Working group 3: "Space and Astrophysics"

Chaired by: Prof. Enrico Flamini, Chief Scientist of the Italian Space Agency
Co-chaired by Doctor João Braga, Chief Researcher of the Division of Astrofísica III of the Instituto Nacional de Pesquisas Espaciais (INPE)

Italian Participants

Dott. Francesco Migliaccio	ANSALDO ENERGIA
Dott.ssa Simonetta Di Ciaccio	ASI
Dott. W. Montagnani	CTNA
Ing. Massimo Comparini	CTNA - SPIN -IT
Prof. Remo Ruffini	ICRA
Prof. Jorge Rueda	ICRA
Prof. Carlo Luciano Bianco	ICRA
Dott.ssa Alessandra Scaffidi	INAF
Dott. Roberto Della Ceca	INAF

Brazilian Participants

Prof. Ivan Marques de Toledo	Rector of the Universidade de Brasília (UnB)
Dott. João Braga	Chief Researcher of the Division of Astrofísica III of the Instituto Nacional de Pesquisas Espaciais (INPE)

- The WG took note that ICRANet, as the 1st international organization establishing a network of centers in the field of relativistic astrophysics, established the international relativistic astrophysics joint PhD program (IRAP-PhD) coordinated in Italy by ICRA.
- The WG recognized that ICRANet has already signed collaboration agreements with many Brazilian institutions. Following the signature of the Seat Agreement between ICRANet and the Brazilian government, a new seat was established in Rio de Janeiro to coordinate all ICRANet activities in Latin America.
- In the future the activities in the ICRANet seat in Rio de Janeiro will require the adjournment of the MCTI annual contribution to ICRANet. The WG expressed the wish that the CAPES-ICRANet program will foster additional collaborations within Latin America.
- E-ELT projects - the WG underlines that ESO has as a requirement the involvement of Brazilian industrial sector in many different areas of cooperation
- The WG took note that should be further investigated the possibility of interoperability between ASI/Malindi and AEB/DCTA/Alcântara stations; these activities could address different kind of missions, using especially both X- and S-band ground systems, for astrophysics and Earth Observation (CBERS);
- The WG identified that could be important to explore the possibility of joint small scientific or Earth Observation(EO) missions. A possibility for up to 100 kg is the opportunity to use the new Brazilian launcher VLM (Veículo Lançador de Microssatélites). For larger missions, it has been also discussed the possibility of the use of a Vega launcher;

- The WG acknowledged that given the availability of a full AIT facility at INPE, Brazil could be an important asset for future joint satellites.
- In the field of EO, it has been outlined the possibility of the use of COSMO/SkyMed resources by the Brazilian community. Cooperation in the geo information application and services as well in technology cooperation in radar and optical instruments will be further explored.
- In the framework of ASI/AEB 2008 letter of intent, it has been envisaged the opportunity for a joint table on key enabling technologies for space.
- The WG observed that there are activities on near-space access through stratospheric platforms presently carried on either in Italy (mainly at the industrial level) and in Brazil (mainly at INPE) that should be further explored to understand the possible mutual benefits.
- The WG notes that INAF will welcome the strengthening of existing collaborations and the creation of future new ones with Brazilian colleagues with specific mobility programs to be jointly defined.
- The WG notes that INAF strongly supports the participation of Brazilian colleagues in the implementation of CTA collaboration, in particular for the ASTRI mini array project that will represent the first seed of CTA.
- The WG acknowledges that Italian industry here represented is open for a program of post-graduate student internship.

The creation of a Joint Research Laboratory on space activities was proposed as an appropriate instrument to organize joint activities of collaboration.