Report of the National Institute of Science and Technology in Astrophysics (INCT-A) - 2012

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What is the INCT-A? – An executive summary

Context

Brazilian Astronomy, although young, has already made some important achievements. The first graduate programs were established in the 1970´s and, since then, the community experimented continuous and vigorous growth. Today nearly 30 institutions support of astronomical research at some level. The first scientific equipment were planned and built in the early 1970´s; an important strategic step was the construction of LNA – the first (and for long time the only one) national laboratory to operate in Brazil. Thanks to this laboratory, Brazilian Astronomy experienced a growth, both in quantity and in quality. This allowed joining the Gemini and SOAR consortia in the 1990´s. These consortia operate world class astronomical instruments.

The situation of optical and infrared astronomy is, thus, quite favorable. The participation in the Gemini and SOAR consortia has put our community in contact with the best practices of science management and, at the same time, integrated networks of specialists. Although the SOAR telescope does not have its full instrumentation operational, we already can state that Brazilian contribution to the publications of both Gemini and SOAR consortia is at the highest ranking. At the same time the perspective of world–class instrumentation has revitalized the various groups and attracted young talented people to the graduate programs.

For the next decade, world astronomy is planning new and significant steps. At all wavelengths, a next generation of telescopes is under construction: optical 20-40m class (GMT, TMT, ELT) telescopes, radio-interferometers (ALMA, SKA), a new generation of space-borne instruments (IXO, Webb) and a large deep optical survey telescope (LSST).

Many of these equipments are multinational initiatives, given the high costs involved, some of them, in the range of a billion dollars and will take 10 to 15 years to be built. Direct participation in such projects is beyond our possibilities, but there are niches from which our astronomy may benefit. The form and intensity of these benefits depend on some new investments but mostly on careful and strategic planning. If this is not done, our community will have less and less opportunities in the international scenarios for the coming decades.

In the present INCT, a significant number of researchers from many institutions meet, to plan and implement actions, having in mind the future of Brazilian Astronomy. ***We are researchers from diverse institutions and of distinct specialties, but we all need the same scientific infrastructure and above all, similar collective strategies.*** *These are the characteristics that provide the* ***unity*** *to this initiative. These strategies are more and more necessary, given the high costs of the new research equipment and timescales needed for their construction.*

Our community already has a national laboratory (LNA) that operates the national infrastructure in optical and infrared astronomy. The INCTA aims toward a partnership with LNA and other institutions to mobilize the community in fostering the best insertion of Brazilian Astronomy in the great international projects underway and those that still will be proposed.

Moreover, we want to promote the culture of technological innovation by supporting the development of world class instrumentation aimed at basic research.

If in the recent past Brazilian Astronomy has advanced in a significant way, its future depends on our planning and organization capabilities. New large and expensive projects are under way in the developed countries, many of them in the form of international consortia, given their high costs, which are prohibitive toward our direct participation. However it is possible to create alternative routes, identifying niches that can bring benefits to our science through creative strategies of international cooperation.

Such associations will increase the networking, both institutional and individual, showing us the best international practices of organization, planning and management of science. This effort is of fundamental importance to provide the environment for the next generation of scientist to perform frontier research.

The "Instituto Nacional em Ciência e Tecnologia em Astrofísica – INCTA", in addition to the host institute, has one associated laboratory (LNA), 3 other MCT research institutes, 14 federal universities, 3 state universities and 6 private universities, comprising a total of 32 research groups, 12 being consolidated and 20 emerging ones in 27 different institutions. A total of 173 PhD scientists are joining the institute; 79 of them have CNPq scientific productivity fellowship, 12 being level 1A.

Misssion

The mission of the National Institute of Science and Technology in Astrophysics is to insert Brazilian Astronomy into the future of the World Astronomy.

Strategic Goals

1- Maximizing the return from the Gemini and SOAR telescopes.

a) Scientific return: Brazil already presents the highest productivity index among the Gemini partners (Brazilians have used 2.3% of the time and published 10% of the papers). For the SOAR telescope this statistical comparison is still premature as the telescope was

built about 5 years later than Gemini. Surely the numbers that matter are not only the number of papers. Quality is also relevant. As a goal, we propose that Brazil maintains the leadership in scientific productivity for both Gemini and SOAR consortia for the next 5 years.

b) Graduate programs: There are 11 graduate programs that offer Master+PhD programs in Astronomy (USP; UFRGS; UFMG; ON; INPE; UFRN; UFSC; UNIVAP; UFSM; OV-UFRJ, FEG-UNESP). Another 4 offer master degree only (UNICSUL; UNIFEI; UESC; UERN). The possibilities opened with the access to the Gemini and SOAR telescopes have attracted many new talented people to Astronomy. Today we have a good number of promising talented young people in our graduate programs and integrating them in the scientific production with the use of large telescopes and world-class instruments is one of the most effective ways of attracting and educating more talented people. Our goal is to double the number of papers published by Brazilian graduate students with data from the Gemini and SOAR telescopes in the next 3 years (2009-11 compared to 2006-08) with a following growth of 15% per year.

c) Supporting emerging groups: Besides attracting and educating talented people, we also want them to get a job in our country. Our major research institutes seem to be saturated growth wise. At the same time, the vast majority of universities do not have a single astronomy professor. In recent years Brazilian Astronomy has, in fact, experimented a new phenomenon: non-traditional universities, both public and private, have hired a number of young and productive astronomers in their faculty. These new groups, often very small in number, need to be supported, integrated in networks and have access to the best existing equipment. Our goal is to double the number of papers published with authors from emerging groups with data obtained from Gemini, SOAR and alike, for the next 3 years, followed by a growth of 15% per year. Among other incentives, INCTA will provide support to their research, by supplying computer equipment to researchers that obtain observing time with large telescopes provided they are justified within the aims of the Institute. We propose to support the participation of people from emerging groups in scientific meetings when presenting results from large telescopes. These groups will also have access to financial support to foster national and international networking, that is, contact with scientists for seminars, to avoid intellectual isolation, as most of these groups are located far from the main centers.

d) Stimulate the development of instrumentation for the Gemini and SOAR telescopes. The Brazilian participation in the Gemini and SOAR consortia has allowed, for the first time, the effective construction of modern instruments for large telescopes. Currently Brazil is concluding the construction of the SIFS – SOAR Integral Field Spectrograph – with 1300 fibers, capable of operating with adaptive optics. Other two instruments are in distinct phases of construction: the Steles (high resolution spectrograph) and the BTFI (Fabry-Perot large field imaging spectrograph). Our goal: to conclude the construction and commissioning of the three instruments underway and begin a new one in the next three years.

2 – Brazilian Astronomy in the era of the LSST and ELT projects. *The next generation of large telescopes is being planned now. The GMT, TMT and E-ELT are in the process of starting their construction. It is important for Brazilian astronomy to establish a strategy for*

the era of ELTs, that will be operational by the year 2020. The Large Synoptic Survey Telescope, on the other hand, is a North-American initiative for building and operating a telescope of 6.5 m effective aperture (8.4m nominal) to monitor the sky in 6 filters. This will be a deep survey with an unprecedented approach in the sense that it will revisit the same regions in the sky at about every 4 days, so that it will add a temporal dimension to the data. The magnitude limit for single observations will be r ~24 and it will have a cumulative limit of r~27.5. This project has 4 main broad goals: a) the nature of dark energy and dark matter; b) The transient sky; c) The structure of the Milky Way and d) The structure of the Solar System. This project will make some observations available in real time having profound impact on Brazilian Astronomy.

***3 – Virtual observatories**. Great part of the data from space missions and also from ground based telescopes is available in databases. These datasets contain a wealth of information and mining them may be of enormous benefit to Brazilian Astronomy, without proportional financial investments. Significant effort in software is imperative to make the appropriate and necessary development. Our goal is to have an operational network of virtual observatories in Brazil within the next 3 years.*

***4 – New projects of scientific equipment**. A minimum of 3 new projects, to be defined by the Science committee, will be elaborated and proposed: at least one in radio-astronomy, at least one scientific satellite and at least one in optical/infrared astronomy. These projects will be elaborated to the point where they can be presented to the funding agencies or to possible international partners.*

*5 – **Education activities:** Brazil has currently about 300 000 teachers of Science and Mathematics. The content and knowledge of Astronomy is minimum. We propose to organize a distance learning course on Astronomy for science teachers all over the Country. The idea is to establish a virtual ambient for an online "distance learning course". We propose to establish partnerships with the State Governments and Universities to create a large network to foster this idea.*

INCT-A: Institutions

INCT-A is a network of 173 researchers of the following institutions

Host Institution:
Instituto de Astronomia, Geofísica e Ciências Atmosféricas – Universidade de São Paulo

Associated Laboratory:
Laboratório Nacional de Astrofísica – LNA

Associated Universities and Institutes (33):

1. **FURG – Fundação Universidade do Rio Grande – RS*
2. **UCS – Universidade de Caxias do Sul - RS*
3. **UDESC – Universidade para o Desenvolvimento do Estado de Sta. Catarina - SC*
4. **UEFS – Universidade Estadual de Feira de Santana - BA*
5. **UEL – Universidade Estadual de Londrina -PR*
6. **UFABC – Universidade Federal do ABC-SP*
7. **UFJF – Universidade Federal de Juiz de Fora-MG*
8. **UFPel – Universidade Federal de Pelotas-RS*
9. **UFS- Universidade Federal de Sergipe - SE*
10. **UFSCar - Universidade Federal de São Carlos – SP*
11. **UFSM – Universidade Federal de Santa Maria-RS*
12. **UNICSUL – Universidade Cruzeiro do Sul - SP*
13. **UNIFEI – Universidade Federal de Itajubá-MG*
14. **UNIFESP - Universidade Federal de São Paulo - SP*
15. **UNIPAMPA – Universidade Federal do Pampa-RS*
16. **UNIVAP- Universidade do Vale do Paraíba - SP*
17. **UNIVASF – Universidade Federal do Vale do São Francisco-PE*
18. *Centro Brasileiro de Pesquisas Físicas - CBPF*
19. *CTA/MD – Comando Tecnológico da Aeronáutica – SP*
20. *Instituto Nacional de Pesquisas Espaciais – INPE*
21. *Observatório Nacional – ON*
22. *UESC – Universidade Estadual de Santa Cruz – Ilhéus/BA*
23. *UFMG – Universidade Federal de Minas Gerais-MG*
24. *UFRGS – Universidade Federal do Rio Grande do Sul-RS*
25. *UFRJ – Universidade Federal do Rio de Janeiro-RJ*
26. *UFSC – Universidade Federal de Santa Catarina-SC*
27. *UNB – Universidade de Brasília - DF*
28. *UNESP – Universidade Estadual Júlio de Mesquita Filho-SP*
29. *Universidade Presbiteriana Mackenzie – SP*
30. ****UFSJ – Universidade Federal de São João Del Rey – MG***
31. ****UFV – Universidade Federal de Viçosa - MG***
32. ****UFPA – Universidade Federal do Pará – PA***
33. ****UFRR – Universidade Federal de Roraima - RR***

(*) – Emergent groups

1. Results obtained by the INCTA in the period 2009-2012.

We will report here our main results obtained during the last 4 years. In this report we will address some of the criticisms raised by the referees of the past reports. It is important to notice that this INCT is quite large (and productive in terms of papers published. But its nature is quite distinct from the vast majority of the others.

1- Maximizing the return from the Gemini and SOAR telescopes.

a) Scientific return

When the INCTA was proposed, Brazilian astronomy was growing at a rate of ~1% per year. This was a rate much smaller than its previous growth of 11% during the period 1970-2000. The program proposed by INCTA has a very clear strategic nature, to change this rhythm and insert Brazilian astronomy in the international scene.

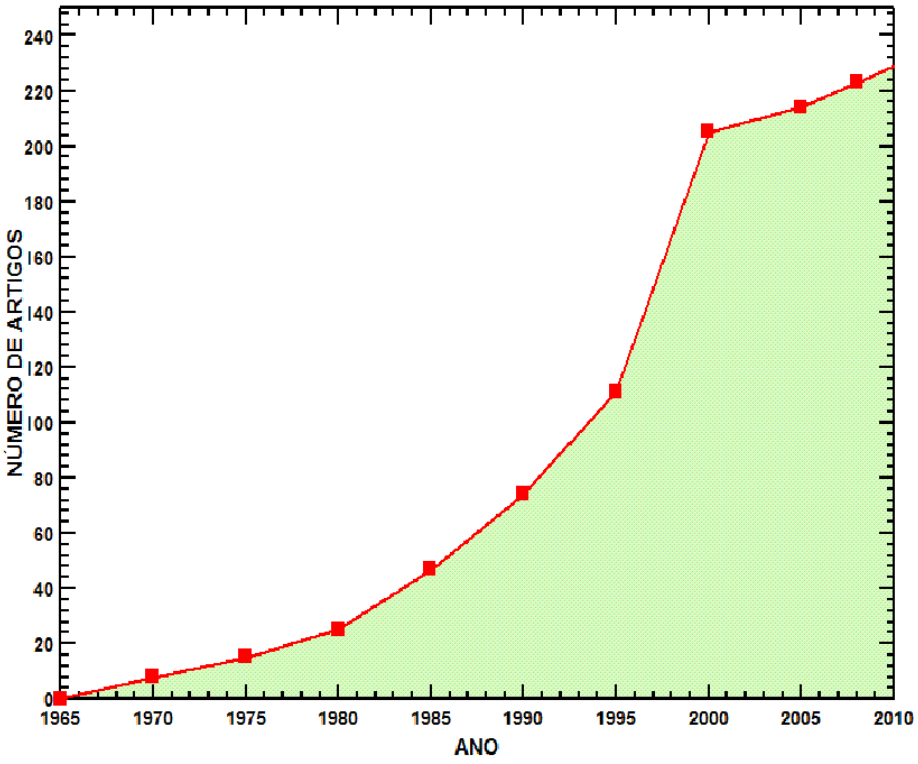

Fig 1. Number of papers published by Brazilian astronomers in referred journals. The growth rate in the period 1970-2000 was 11% per year. From 2000 to 2008 this rate decreased to ~1% per year.

The Gemini and SOAR telescopes offer the possibility reach such a goal. After 4 years, it is time to assess the current status. In the following table (Table A) we show the number of papers per telescope in the period 2001-2012.

Table A - Comparative table of papers, per biennium (2001-2012)

	Gemini	***SOAR***	***CFHT***	***OPD***	***Total***
2011+12	31+1*	12+3*	0+2*	31+2*	82
2009+10	29	11+5*	-	29	74
2007+08	23	8+2*	-	27	60
2005+06	14	6+1*		47	68
2003+04	8	0+2*		36	46
2001+02	1			43	44

Papers com (*) são de instrumentação.

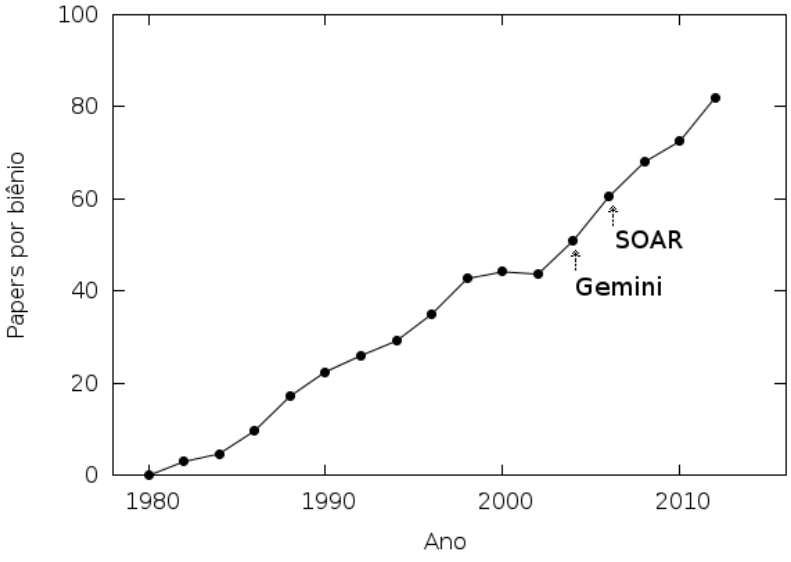

Figure 2. Number of papers per biennium published with data from the telescopes managed by LNA. The beginning of the productive phase of Gemini and SOAR telescopes is shown.

During the period of 2005-2008, Brazilian astronomers published 51 papers with data from the Gemini+SOAR telescopes. During the period of 2009-2012, this number increased to 83 papers. The growth rate between 2007+08 to 2011+12 was ~8% per year.

Table B - Comparative table of Brazilian production in the context of Gemini telescopes, per biennium (2001-2012)

	2001-10	*2011+12*
Nr papers total Gemini	824	354
Nr papers w/ Brazilian authors	75	31
Nr papers w/ first author Brazilian	60	24
% time used by Brazil	2.3%	4.6%
% papers w/ Brazilian authors	9.1%	8.8%
% papers w/ with first author Brazilian	7.3%	6.8%

At the same time Table B shows that the number of papers published by Brazilian astronomers is significantly higher than the average of the partnership. It is clear that the Gemini and SOAR telescopes are showing their scientific production at a progressive pace. The tendency seen in Figure 1 suggest that this tendency will continue.

b) Graduate programs

During the 4 years of 2005-08 the number of Master and PhD theses based on data from Gemini+SOAR telescopes was 15. During the 4 subsequent years, 2009-12 this number increased to 32. From 2007+08 to 2011+12 the growth rate was 15% per year. This shows that in this particular area of astronomy, the growth is quite significant. The contribution of the Gemini and SOAR telescopes is, perhaps, even more convincing here than in the scientific production, as shown n Figure 2.

Table C – Comparative table of the Master and PhD theses, per biennium (2001-2012).

	Gemini	*SOAR*	*CFHT*	*OPD*	*Total*
2011+12	9	8+2*	2	16	30+3**
2009+10	5	6+2*	-	15	28
2007+08	10	1	-	11	20+1**
2005+06	4	-		10	14
2003+04	1			16	17
2001+02	2			12	14

Master theses in instrumentation are with (*).
Theses with more than one telescopes are with (**).

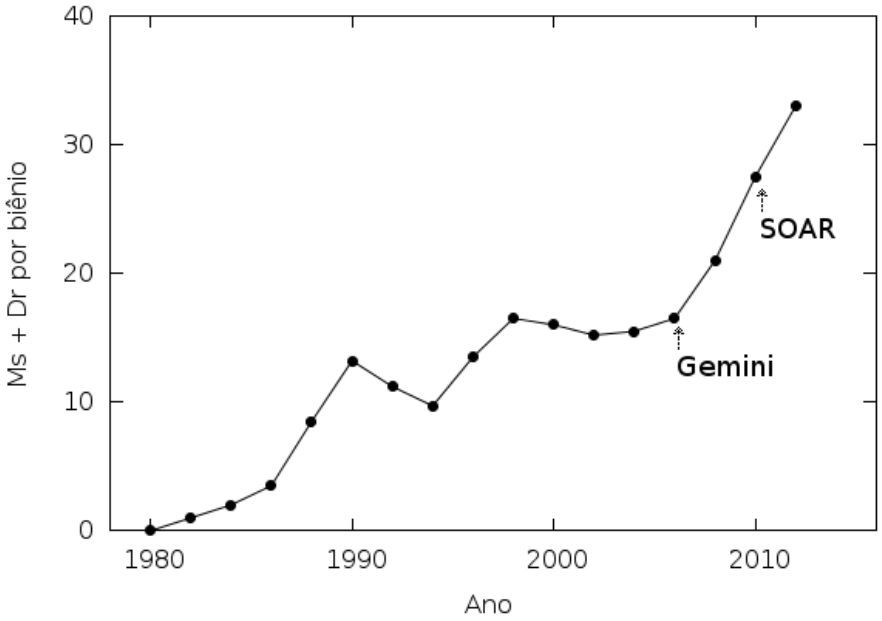

Figure 3. The number of Ms and PhD theses containing data from telescopes managed by LNA. The beginning of the productive phase of the Gemini and SOAR telescopes is shown.

c) Supporting emerging groups

During the 4 years of INCTA, a total of 16 lap-top and 12 desk-top computers were allocated to the emerging groups. In addition, 2 Virtual Observatory servers where also allocated.

The INCTA provided Astronomy books to 19 institutions with emerging groups.

A great effort in providing fellowships to emerging groups was also made. 49 IC, 7 Ms and 1 Dr fellowships where allocated to them. Perhaps as a consequence, 1/3 of all Ms theses were granted by these groups, as shown in Table E.

d) Stimulate the development of instrumentation for the Gemini and SOAR telescopes.

According to Table C, the first Master Theses in instrumentation for large telescopes started in the period 2009-2012, when a total of 4 theses where obtained.

At the same time, the number of instrumentation papers increased by a large factor, going from 3 in the period of 2005-08 to 13 in the four following years. An increase of 41% per year between 2007+08 and 2011+12.

More importantly, the largest amount of money allocated by INCTA during the last 4 years was to the instrument BTFI (Brazilian Tunable Filter Imager). This instrument is under commissioning on the SOAR telescope and its first images have been obtained (see below). The instrument SFS (SOAR Integral Filed Spectrograph) was also supported by the INCTA, but at lower level, basically for transportation expenses and commissioning.

The number of Brazilian authors in instrumentation pares is 7 for the Gemini telescope and 43 for the SOAR telescope. This is quite impressive for an area that was much smaller previous to the SOAR telescope instrumentation program.


The BTFI

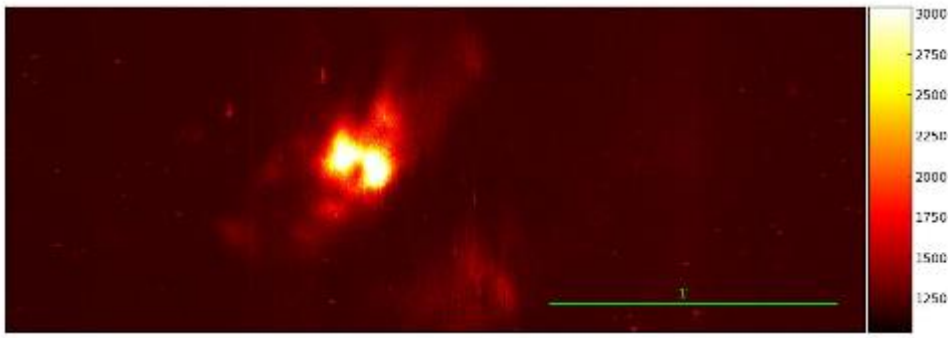

Image of the planetary nebula NGC 2440 obtained with the BTFI.

Table D - Number of Brazilian authors (2001-2012)

	Gemini	*SOAR*	*CFHT*
Nr of Brazilian authors in papers with data	93	65	0
Nr of Brazilian authors in instrum. papers	7	43	1

2 – Brazilian Astronomy in the era of the LSST and ELT projects.

In the year 2012 (April 1 to 4) an important workshop was held in Campos do Jordão:

Science with the LSST: a Brazilian/US Joint Workshop
In this meeting both the Brazilian as the US side presented their perspectives and potential use and development for this telescope.

With regards to the ELTs, no new developments happened in 2012.

3 – Virtual observatories.

The year of 2012 was very rich in activities regarding the BRAVO (Brazilian Virtual Observatory) initiative. The following activities and events where held:

- ***Primeiro Workshop de e-Science na Astronomia Brasileira***
  09/03/12 – IAG-USP – S. Paulo – SP

- ***Bravo Challenge***
  May/12 - October/12

- *Trilha de Astronomia na XXXII Reunião Anual da SBC +SAB*

  **** VO Day in SAB***

  **** Bravo VO School***

- ***Interoperability Meeting to IVOA***
  (INCTA+Sociedade Brasileira de Computação)
  July/12 a October/12

- **XXXII Congresso da Sociedade Brasileira de Computação – BRAVO**
  Curitiba

4 – New projects of scientific equipment

Two instruments were supported to this point:
1 - The LLAMA radio dish that has the purpose to make interferometry with the ALMA interferometer. In funding stage by FAPESP.
2 – JPAS (Javalambra Physics of Accelerating Universe). This is meant to build and operate a 2.5 m telescope for Cosmology. It is a joint Brazil-Spain consortium to install the telescope in Spain.

5 – Education activities: EAD – Science teachers training program

After 2 years of development, the first course for science teachers was held in 2011. The course lasted 18 weeks and the conclusion was that it should take longer. The list of approved teacers in 2011 is given in table E.

2011 – 18 weeks
86 enrolled
33 dropouts
10 failed in examinations
43 aproved

Table E - EaD Aproved - 2011

	NOMES	CIDADE
01	Adriana Hitomi Deguchi	São Paulo
02	Ana Paula Freire da Silva	Ferraz de Vasconcelos
03	Anderson Ramos da Silva	São Paulo
04	Andre Fernando de Sousa	São Paulo
05	Antonio Beltrame	São Paulo
06	Carlos Alberto de Lima	Sumaré
07	Carlos Richard Eduardo Matheus Lizárraga	Campinas
08	Denise Assis da Silva	São Paulo
09	Eliane Honorio de Oliveira	São Paulo
10	Elton Morais Barbosa	Itaquaquecetuba
11	Fábia Almeida Lino	São Paulo
12	Fabiano de Padua Conceição	São Paulo
13	Fabio Roberto Lessa de Oliveira	Santos
14	Fernando Augusto Silva	Guarulhos
15	Francimara Nascimento da Silva Marcondes	Jundiaí

16	Hildebrando José Balieiro Ramos	São Paulo
17	Janecleia Alves Lourenço	Artur Nogueira
18	Joao Wesley da Silva Nunes	Guarulhos
19	José Manoel Damas Neto	Guarulhos
20	Josué Antunes de Macêdo	São Paulo
21	Juraci Pereira Sotero	Juina / MT
22	Liliane Pimentel da Silva	Ferraz de Vasconcelos
23	Luana Neri Thomaz da Silva	São Paulo
24	Lyara Araujo Gomes	Pindamonhangaba
25	Margarete Agosta de Arruda	Salto
26	Maria Helena Pereira	São Paulo
27	Mauricio Galante Muzetti	Jundiaí
28	Michele Aparecida Alves Lopes	São Paulo
29	Miriam Milanelo	Mairiporã
30	Nathali Ingrid de Castro	São Paulo
31	Nathalia Lopes Valderrama	São Paulo
32	Patricia Petricone Moraes	São Bernardo
33	Paulo Alexsandro Veloso	São Vicente
34	Regiane Souza Pinto	São Paulo
35	Reinaldo Borges Júnior	São Paulo
36	Renata da Silva Cavalcanti	São Paulo
37	Roberta Miyuki Toledo de Amorim	São Paulo
38	Roberto Galvani Felipe	São Caetano

39	Roger Toledo de Amorim	São Paulo
40	Rogerio Carlos dos Santos	São Paulo
41	Sibele Cristine Girotto Maziero	São Paulo
42	Valentina Aparecida Bordignon	São Paulo
43	Vitor Pereira Belotto	Santos

In 2012 the course was extended to 29 weeks and it worked out better.

2012 –29 weeks
108 enrolled
49 dropouts
13 failed in examinations
46 proved

Table F – EaD: Aproved - 2012

	NOMES	CIDADES
01	Alvaro Jean Borges Almeida	São Paulo
02	Ana Lucia Cavalca Fernandes Franco de Oliveira	Guaratinguetá
03	Ana Lucia Protasio de Almeida	Taboão da Serra
04	Antonio Carlos da Silva	São Paulo
05	Aparecida Ramos Fortes Pereira	São Paulo
06	Ariana Souza de Santana	São Paulo
07	Aurea Lucia de Oliveira Dantas Albuquerque	São Paulo
08	Breno Alexandre Dalosto	São Paulo
09	Cely Garcia Fernandes Pereira	São Paulo
10	Clélia Scalon de Medeiros	Taubaté
11	Daniel Atkocius Filho	São Paulo
12	Décio Carlos Namba	São Paulo

13	Douglas Rizzi	São Paulo
14	Enilce Aparecida Junquetti Ferraz da Motta	Lorena
15	Fernanda Gracielly Moura Alves	São Paulo
16	Fernando Cesar Dalben Posse	São Paulo
17	Francisco Mondillo Neto	São Paulo
18	Genesio Ferreira Parreira	Itaquaquecetuba
19	Jackeline Suelen do Nascimento	São Paulo
20	Jenifer Garcia	São Paulo
21	José Aparecido Requena	Mogi das Cruzes
22	Luciene Oliveira de Azevedo do Rosario	Guarujá
23	Lucineide Sales Marciano	São Paulo
24	Magaly Consulino	São Paulo
25	Mara Lúcia Teixeira Rosa	Guaratinguetá
26	Marco Aurelio Correa	São Paulo
27	Mariana Ferreira Campello	São Paulo
28	Marilin Celisa Cannavan	Sorocaba
29	Monique Sanfilippo Rojas	São Paulo
30	Nágila Euclides da S. Polido	São Paulo
31	Nanci G. Ribeiro Guimaraes	Rio de Janeiro/RJ
32	Patricia Correa	Avaré
33	Patricia Takahashi Lopes	Embu das Artes
34	Pedro Filipini Netto	São Paulo
35	Rafael de Castilho Cezzaretti	São Paulo
36	Raimundo Gomes Soares	São Paulo

37	Renata Correia da Silva	Sorocaba
38	Renata Correliano Nardocci	Bragança Paulista
39	Ricardo Kokay Arpiani	São Paulo
40	Robinson Ferreira de Araujo	São Paulo
41	Rosineide Ramos Celestino	Várzea Paulista
42	Sandra Neres da Silva	São Paulo
43	Sara Ferreira Parreira	Mogi das Cruzes
44	Sergio Chaves Jardim	Itaquaquecetuba
45	Simone A. Pereira da Silva	Aparecida do Norte
46	Tatiane Santos Rosa	São Paulo

2.

3. General production of papers and theses by INCTA members

A total of 90 master and 46 PhD theses were obtained in the period of 2009 to 2012 under the advice of the INCTA members. 1/3 of all Ms theses where granted by the emerging groups. The following table shows the distribution per institution, per year.

Table E

	2009		2010		2011		2012		Total	
	Ms	Dr	Ms	Dr	Ms	Dr	Ms	Dr	Ms	Dr
IAG-USP	**8**	**4**	**10**	**7**	**7**	**5**	**5**	**10**	**30**	**26**
INPE	**2**	**0**	**1**	**1**	**2**	**0**	**1**	**2**	**6**	**3**
ON	1	0	4	1	2	1	3	1	10	3
UFRGS	**1**	**3**	**3**	**0**	**3**	**1**	**1**	**4**	**8**	**8**
UNIFEI			1		2				3	
UNIVAP			**2**		**2**		**2**		**6**	
UNICSUL			**2**				**4**		**6**	
UFSM	**2**	**1**			**0**	**1**			**2**	**2**
UFMG	**1**		**1**		**2**	**1**	**1**	**1**	**5**	**3**
UFRJ/OV	**3**		**3**		**3**		**1**		**10**	
UFSC				**1**	**1**	**1**	**2**		**3**	**2**
UESC										
Emergent groups	*5*	*1*	*8*	*1*	*10*	*2*	*7*	*1*	*30*	*5*
Total	**19**	**8**	**27**	**10**	**24**	**10**	**20**	**18**	**90**	**46**

The total number of papers published by the INCTA members in international refereed papers during the period 2009-12 was 701. Of these papers, 82%were published in journals considered Qualis A by CAPES.

	2009	2010	1011	2012	Total
Papers	148	177	202	174	701
Qualis A	83%	78%	85%	83%	82%
Qualis B	11%	12%	5%	2%	7%
Others	6%	10%	10%	15%	11%

4. Investments made in the period 2009-2012

Acquisition of computer facilities for emerging groups (2009-2011):

- **16 Lap-top computers:**

1. *Alexandre Soares de Oliveira (UNIVAP)*
2. *Cássio Barbosa (UNIVAP)*
3. *Fabrício Ferrari (UNIPAMPA)*
4. *Gabriel Hickel (UNIFEI)*
5. *Hecktor Monteiro (UNIFEI)*
6. *Lucimara Martins (UNICSUL)*
7. *Nádja Magalhães (UNIFESP)*
8. *Paulo Afrânio Lopes (OV-UFRJ)*
9. *Sergio Pilling (UNIVAP)*
10. *Wilton Dias (UNIFEI)*

- ***11 Desk-Top computers:***

1. *André Ribeiro (UESC)*
2. *Antonio Guimarães (UFRJ- Macaé)*
3. *Diego Falceta-Gonçalves (USP-Leste)*
4. *Gabriel Hickel (UNIFEI)*
5. *Gustavo Lanfranchi (UNICSUL) x2*
6. *Henry Plana (UESC)*
7. *Irapuan Rodrigues (UNIVAP)*
8. *Ivan Soares (UNB)*
9. *Rogemar Riffel (UFSM)*

Videocon equipment
Sílvia Lorenz (UFRJ)

Virtual Observatory servers:
Paula Coelho (UNICSUL)
Roberto Cid Fernandes (UFSC)

Equipment acquired in 2012

Lap-tops:

1. João Maria Silva (UFCG)
2. Kelly Torres Dozinel (UFSJ)
3. Marcelo Guimarães (UFSJ)
4. Diana Pilling (UNIVAP)
5. Natalia Landin (UFSJ)
6. Carlos Dutra (UNIPAMPA)

Desk-tops:

1. SOAR remote observing room (IAG)
2. Antonio Guimarães (UFRJ – Macaé)
3. Alexandre Zabot (UFSC-Joinvile)

No-breaks:

1. Nobreak for the IAG cluster Alfa Crucis
2. Nobreak for EaD

SOAR remote observing station

Raimundo Lopes (UFS)

Acquisition of Astronomy books for emerging groups

1. 2x UESC
2. FURG
3. UEFS
4. UFABC
5. UFCG
6. UFRJ/Observatório Valongo
7. UFRJ-Macaé
8. UFS
9. UFSC
10. UFSC - Joinvile
11. UFSJ
12. UFSM
13. UFV
14. UNICSUL 2x
15. UNIFEI
16. UNIFESP
17. UNIPAMPA
18. UNIVAP 2x
19. UNIVASF

Acquisition of computer facilities for community use

High Performance GPU processor
Alex Carciofi (IAG-USP)
This equipment, running at 2.3 teraflops, has been installed at IAG-USP for community use.

Desk-top computer were allocated to people working for the INCT-A
Carlos Paladini (IAG-USP)
Anne Louise Scarinci (IAG-USP)
Maria Teresa Lopes (IAG-USP)

The super cluster Alfa Crucis installed at IAG-USP was opened to all INCTA members with the investment made by INCTA.

International Travel (2009-2011)

- Visit to ALMA (Chile)
- Visit to TMT and GMT (Pasadena CA-USA)
- PFS (Los Angeles – USA)
- J-PAS (Terruel - Spain)
- SPIE Astronomical Telescopes and Instrumentation (San Diego-USA)
- Asymmetric Planetary Nebulae V (UK)-Denise Gonçalves
- Virtual Observatory (Munich - Germany)
- Virtual Observatory (Victoria - Canada)
- Gemini users training (Tucson – USA)
- Visit to SPARTAN (Chile)
- Observation mission to IRTF (Hawaii)
- Virtual observatory (Naples - Italy)
- Workshop Astro-informatics 2011 - Sorrente, Itália
- Visit to the Open University (EaD) Milton Keynes, England
- Meeting with LSST – Tucson AZ USA
- Meeting with CFHT – Hawai USA
- J-PAS meeting – Terruel, Spain
- 15 trips to La Serena for the Comissioning of the SOAR instruments SIFS and BTFI

International Travel (2012)

Comissionamento BTFI (Early Science) **- TOTAL: 14 viagens**

Janeiro: Henri Plana, Fabricio Ferrari e Renato Severo
Maio: Denis Andrade
Julho: Alvaro, Denis Andrade, Bruno Quint, Claudia Oliveira e Keith Taylor
Setembro: Denis Andrade

Novembro: Denis Andrade, Álvaro Calasans e Claudia Oliveira
Janeiro/2013: Bruno Quint

SIFS (Early Science) – TOTAL: 6 viagens

Maio: Orlando Verducci e Flavio Ribeiro (La Serena)
Julho: Orlando Verducci (La Serena)
Janeiro/2013: Rodrigo Vilaça, Ligia Oliveira e João Batista Oliveira (treinamento nos EUA)

BraVO
Maio: Alex Carciofi e Paula Coelho (IVOA interoperability meeting 2012, University of Illinois)

Other trips:

Fevereiro: André Amorim, Antonio Kanaan, Fabricio Ferrari e Henrique Xavier – (Reunião J-PAS em Madrid)
Maio: Vinicius Placco (Colaboração científica com a profa. Anna Frebel no MIT (Massachussets Institute of Technology)
Junho: Anne Scarinci (participação no The World Conference on Physics Education, Istanbul)
Julho: Denise Gonçalves, Eduardo Telles, Rogemar Riffel, Rogerio Riffel, Astor Schonell e Marlon Diniz (participação no Gemini Science Meeting, San Francisco)
Agosto: Bruno Castilho (The 2012 LSST All Hands Meeting,Tucson)
Dezembro: Marcos Lima – (reunião cientifica do Dark Energy Survey (DES), Texas A&M University)

Support to Instrumentation (2009-2012)

- SIFS – SOAR Integral Field Spectrograph
- BTFI –Brazilian Tunable Filter Interferometer
- STELES – SOAR Telescope Echelle Spectrograph
- LLAMA- Latin-American Astronomical Millimetric Array
- JPAS –Javalambra Physics of the Accelerating Universe
- SPARC4 - A simultaneous polarimeter and rapid camera in 4 bands

Events held in 2009 - 2011

Space Astronomy in Brazil
IAG-USP, held in September 2009
INCT-A + INCT INESPAÇO

Instrumentation
USP-São Carlos, School on Instrumentation for Astronomy and Organic Electronics held in September 2010.

INCT-A + INCT Organic Electronics

The ASTER project
Sao Jose dos Campos, 27/10/2010
INPE+INCT-A

Verão Quântico 2011
Anchieta ES 20 a 25/2/2011
CAPES+CNPq+INCTA

First International Symposium on Science with the SOAR Telescope
Maresias, SP – 13-19/05/11
INCTA+LNA

I Workshop de Computação Científica em Astronomia
UNICSUL 02-05/06/11
INCTA

Workshop LLAMA
FAPESP – 8 e 9/08/11
INCTA

South American Gemini Data Workshop
S. Jose dos Campos, 27-30/10/2011

Events held in 2012

Primeiro Workshop de e-Science na Astronomia Brasileira
09/03/12 – IAG-USP – S. Paulo - SP
INCTA

Science with the LSST: a Brazilian/US Joint Workshop
Campos do Jordão 01 a 04/04/2012
INCTA+LNA – R$ 45.301,06

Bravo Challenge
May/12 - October/12
INCTA

Trilha de Astronomia na XXXII Reunião Anual da SBC +SAB

**** VO Day in SAB***

**** Bravo VO School***– R$ 46.174,43

**** Interoperability Meeting to IVOA***
(INCTA+Sociedade Brasileira de Computação)
July/12 a October/12

Reunião do J-PAS
São Paulo - R$ 6.644,60

XV Curso de introdução à Astronomia e Astrofísica
INPE – R$ 4.091,66

XXXII Congresso da Sociedade Brasileira de Computação – BRAVO
Curitiba – R$ 4.952,94

III International Conference on Quantum Theories and Renormalization Group in Gravity and Cosmology
Grupos Emergentes (UFJF) – R$ 11.726,30

Conferência Galactic Nuclei and Their Connection With Stars and the Environment
UFRGS – Gramado - R$ 23.100,00

FELLOWSHIPS ALLOCATED BY THE INCT-A

Fellowships: IC (2009-2011)

1. Adam Smith Gontijo Brito de Assis (Orientador: Ivan Soares Ferreira/UNB)
2. Aghata Harumi da Costa (Orientadora: Rose Clívia dos Santos/UNIFESP)
3. Anderson Seiji Okada (Orientadora: Nadja Magalhães/UNIFESP)
4. Ariana Franca Clavia (Orientador: Luiz Paulo Vaz/UFMG)
5. Dalton Dias Meira (Orientador: Francisco Carlos R. Fernandes/UNIVAP)
6. Arthur Eduardo da M. Loureiro (Orientador: Horácio Dottori/ UFRGS)
7. Calliu Icaro da Silva Soares Rosa (Orientador: Militão Figueiredo/ UNIVASF)
8. Davi Rohe Salomon da Rosa Rodrigues (Orientador: Daniel Müller/UNB)
9. Dino Beghetto Junior (Orientador: Irapuan Rodrigues Oliveira Filho/UNIVAP)
10. Elizabete Guitzel (Orientadora: Nadja Magalhães/UNIFESP)
11. Felipe de Paula Lima (Orientador: Ivan Soares Ferreira/UNB)
12. Filipe Fontanela (Orientador: Raymundo Baptista/UFSC)
13. Francisco Elânio Bezerra (Orientador: Gustavo Lanfranchi/UNICSUL)
14. Frederico Guilherme de Oliveira (Orientador: Sergio Pilling/UNIVAP)
15. Frederico Vilela de Lima (Orientador: Anderson Caproni/UNICSUL)
16. Gabriel Martins Palma Perez (Orientador: Jorge Melendez/IAG)
17. Gabriela Augusta Prando (Orientador: Gustavo Rojas/UFSCAR)
18. Graciana Brum João (Orientador: Fabrício Ferrari/ FURG)
19. Guilherme Muller Peccini (Orientador: Horacio Dottori/UFRGS)

20. Jose Declerk Buaca Sinadinse (Orientador: Francisco Carlos Rocha Fernandes/UNIVAP)
21. Helder José Farias Lima (Orientador: Alexandre Soares de Oliveira/UNIVAP)
22. Jamille Almeida Feitosa (Orientadora: Maria Jaqueline Vasconcelos/UESC)
23. Levy Scalise Maciel (Orientador: Tatiana Michtchenko/IAG)
24. Luenne Nailam Sousa Nascimento (Orientador: André Luis Batista Ribeiro/UESC)
25. Luis Fernando Basso (Orientador: Odilon Giovannini/UCS)
26. Marcos Antonio Fonseca Faria (Orientadora: Tania Domicini/LNA)
27. Mariana Arantes Mazzi (Orientador: Augusto Damineli/IAG)
28. Nyergton Barreiros dos Santos Costa (Orientador: Militão Vieira Figueredo/UNIVASF)
29. Pablo Chagas Oliveira (Orientadora: Thaisa Storchi-Bergmann/UFRGS)
30. Rafael Luiz Bernardi (Orientador: Abílio Mateus Jr/ UFSC)
31. Rafael Pantaleão Moreira (Orientador Oli Dors Jr/ UNIVAP)
32. Renato da Silva Severo (Orientador: Fabricio Ferrari /UNIPAMPA)
33. Renato Mello da Silva Farias (Orientador: Wagner Marcolino/Observatório do Valongo)
34. Rodrigo Voivodic (Orientador: Laerte Sodré Junior/IAG)
35. Sergio Henrique M. Douwens dos Santos (Orientador: Valerio Carruba/UNESP)
36. Thiago Marcel de Almeida Santana (Orientador; Iranderly Fernandes/UEFS)
37. Wagner Schlindwein (Orientador: Raymundo Baptista/UFSC)
38. Walter Silva Martins Filho (Orientadora: Thais Mothé Diniz/OV) Alexandre Campos
39. Vergueiro Monteiro de Almeida (orientador Caius Selhorst/UNIVAP)

Fellowships "Iniciação Científica" – 2012

1 - Alexandre Campos Vergueiro Monteiro de Almeida (Orientador: Caius Selhorst / UNIVAP)
2 - Andrea Elisabete de Paula (Orientador: Odilon Giovannini / UCS)
3- Ariana Franca Clavia (Orientador: Luiz Paulo Vaz / UFMG)
4 - Caio Cézar Gomes Laranjo (Orientador: Alexandre Oliveira / UNIVAP)
5 - Carolyne Santos de Oliveira (Orientadora: Karin Delmestre / Observatório do Valongo)
6 - Cilon Vianna Leão (Orientadora: Daniela Pavani / UFRGS)
7 - Eduardo Lourenço de Andrade (Orientador: Raymundo Baptista / UFSC)
8 - Elvis William Carvalho Cantelli (Orientadora: Beatriz Barbuy / IAG)
9 - Fábio Pinto Rodrigues (Orientador: Alberto Ardila / LNA)
10 - Frederico Guilherme de Oliveira (Orientador: Sergio Pilling / UNIVAP)
11 - Gabriel Martins Palma Perez (Orientador: Jorge Melendez / IAG)
12 - Gabriela Augusta Prando (Orientador: Gustavo Rojas / UFSCAR)
13 - Giovane Galdino da Silva (Orientador: Caius Selhorst / UNIVAP)
14 - Guilherme Müller Peccini (Orientador: Horacio Dottori / UFRGS)
15 - Jessica Caroline dos Santos Simplício (Orientador: Jorge Melendez / IAG)
16 - João Vitor Frossard (Orientador: Ilya Shapiro / UFJF)
17 - Jose Declerk Buaca Sinadinse (Orientador: Francisco Fernandes / UNIVAP)
18 - Leonardo Augusto Gonçalves dos Santos (Orientador: Hektor Monteiro / UNIFEI)
19 - Leonardo de Albernaz Ferreira (Orientador: Fabricio Ferrari / FURG)
20 - Levy Scalise Maciel (Orientadora: Tatiana Michtchenko / IAG)

21 - Lucas Gustavo Gonçalves Pimenta (Orientador: Eduardo Cypriano / IAG)
22- Luenne Nailam Sousa Nascimento (Orientador: André Ribeiro / UESC)
23 - Luis Fernando Basso (Orientador: Odilon Giovannini / UCS)
24 - Luiz Filipe Hermes Calvi (Orientador: Antonio Guimarães / UFRJ-Macaé)
25 - Marcus Vinícius Araújo Moreno (Orientador: Antonio Guimarães / UFRJ-Macaé)
26 - Mariana Arantes Mazzi (Orientador: Augusto Damineli / IAG)
27 - Nyegirton Barreiros dos Santos Costa (Orientador: Militão Figueredo / UNIVASF)

Fellowships "Iniciação Científica" – 2013

1) Pedro Antonio Batista Brito (Orientador: Henri Plana / UESC)
2) Isabel de Jesus Lima (Orientador: Eduardo Amores / UEFS)
3) Pietro Soares Ramalho (OrientadorA: Rose Clivia / UNIFESP)
4) Andressa Rossini Goulart (Orientador: Carlos Dutra / UNIPAMPA)
5) Pedro Papini de Araujo (Orientador: Eduardo Bica / UFRGS)
6) Caio Rodrigues dos Santos (Orientador: Valério Caruba / UNESP)
7) Eduardo Luann Wojcikiewicz Duarte Silva (Orientador: Raymundo Baptista / UFSC)
8) Marcos Felipe Faria Terra Siqueira (Orientador: Gabriel Hickel / UNIFEI)
9) Natasha Fioretto Aguero (OrientadorA: Tatiana Michtchenko / IAG)
10) Otavio MiIgliavacca Madalosso (Orientador: Haroldo Velho / INPE)

Fellowships: master (2009-2011)

1. Alexandre Bergantini de Souza (Orientadora: Diana Andrade/UNIVAP)
2. André Luiz de Amorim (Roberto Cid Fernands/UFSC)
3. Astor Leão Schonell Jr (Orientador: Rogemar Riffel/UFSM)
4. Bruno Correia Mota (Alex Carciofi/ IAG-USP)
5. Fellipy Dias Silva (Orientadora: Thais Idiart/IAG-USP)
6. Iara Tosta e Melo (Orientador: Anderson Caproni/ UNICSUL)
7. Luciana de Oliveira Ruiz (Orientador: Gustavo Lanfranchi/UNICSUL)
8. Suzi Izaquiel Ferreira Diniz (Orientadora: Lucimara Martins/UNICSUL)
9. William Schoenell (Orientador: Roberto Cid Fernandes Junior/UFSC)

Fellowship: Doctorate (2009-2011)
Carlos Augusto Molina Velasquez (Paulo Afrânio Augusto Lopes/OV-UFRJ)

Fellowship: Technological and industrial development (2009-2011)

1. Áurea Garcia (LNA)
2. Marília Jobim Sartori (LNA)

Fellowship: Technological and industrial development (2012 / 2013)

1 - Marília Jobim Sartori / LNA

Fellowship: Apoio Técnico-Nível Superior - 2012 / 2013:

1 - Juliano Romani / UFSC

Fellowships: Post-Doctorate (2009-2011)

1. Anne Louise Scarinci Brandao (Orientador: Diego Falceta Gonçalves-EAD/USP)
2. Cintia Quireza Campos (Orientadora: Denise Rocha Gonçalves/OV-UFRJ)
3. Daniela Borges Pavani (Orientador: Eduardo Bica/UFRGS)
4. Dinah Moreira Allen (Orientador: Diego Falceta Gonçalves-EAD/USP)
5. Iranderly Fernandes de Fernandes (LNA)
6. Marcos Vinicius Borges Teixeira Lima (Orientador: Laerte Sodré/IAG-USP)
7. Marina Trevisan (Reinaldo Carvalho/INPE)
8. Natalia Vale Asari (Orientador: Roberto Cid Fernandes Junior/UFSC)
9. Paulo Fernando Penteado (Cláudia Mendes de Oliveira/IAG-USP)
10. Tiago S. Gonçalves (Paulo Afrânio Lopes/OV-UFRJ)

Fellowships: Post-Doctorate – 2012/2013

1 - Denilso da Silva Camargo / UFRGS
2 - Dinah Moreira Allen / EACH
3 - Francisco Ferreira de Souza Maia / UFMG
4 - Marina Trevisan / INPE

Fellowships: Visiting Fellow (BEV-A)

Noemi Pinilla-Alonso (Orientadora: Thais Mothé-Diniz/UFRJ)

Appendix A

SCIENTIFIC PRODUCTION – 2009/2012

Table 1 - Distribution of the papers published by the INCT-A researchers in 2009, by journal

Journal	Qualis	Nr of papers	%
A&A	A2	34	23
MNRAS	A2	35	23
ApJ	A1	27	18
PhRvD	A2	10	7
AJ	A2	10	7
PhRvL	A1	1	1
AstL	s/c	1	1
CoPhC	s/c	1	1
JCAP	A1	5	3
PhLB	A2	3	2
Icarus	B1	2	1
GReGr	B2	1	1
AdSpR	s/c	4	3
APh	B3	1	1
P&SS	s/c	1	1
CeMDA	B4	1	1
ApSS	B4	4	3
RMxAA	B1	1	1
New Astron	B2	2	1
IJMPA	B3	3	2
PASJ	B1	1	1
PASA	s/c	2	2
Ast L	s/c	1	1
PhRvL	A1	1	1
CoPhC	s/c	1	1

Total 148 papers:

83% Qualis A
11% Qualis B
6% Others

Table 2 - Distribution of the papers published by the INCT-A researchers in 2010, by journal

Journal	Qualis	Nr of papers	%
A&A	A2	45	25
MNRAS	A2	36	20
ApJ	A1	25	14
PhRvD	A2	13	7
AJ	A2	9	5
JCAP	A1	6	3
Icarus	B1	4	2
IJMPA	B3	8	4
AdSpR	s/c	6	3
APh	B3	2	1
ApSS	B4	5	3
RMxAA	B1	2	1
New Astron	B2	1	1
Nature	A1	1	1
PhLB	A2	2	1
PhRvC	A2	1	
JphCS		2	
IJT		1	
EL		1	
Cos Re		1	
SoPh		1	
JGRE		1	
CQGra		1	
AdAst		1	
AN		1	

Total: 177 papers

78% Qualis A
12% Qualis B
10% Others

Table 3 - Distribution of the papers published by the INCT-A researchers in 2011, by journal

Journal	Qualis	Nr of papers	%
A&A	A2	47	23
MNRAS	A2	55	27
ApJ	A1	43	21
PhRvD	A2	7	3
AJ	A2	12	6
JCAP	A1	6	3
Icarus	B1	3	1
IJMPA	B3	2	1
AdSpR	s/c	-	-
APh	B3	-	-
ApSS	B4	2	1
RMxAA	B1	2	1
New Astron	B2	-	-
Nature	A1	1	
PhLB	A2	1	
PhRvC	A2	-	
JphCS		1	
IJT		-	
EL		-	
Cos Re		-	
SoPh		-	
JGRE		1	
CQGra		1	
AdAst		1	
AN		-	

Total: 202 papers

85% Qualis A
5% Qualis B
10% Others

Table 4 - Distribution of the papers published by the INCT-A researchers in 2012, by journal

Journal	Qualis	Nr of papers	%
A&A	A2	41	24
MNRAS	A2	47	27
ApJ	A1	39	22
PhRvD	A2	4	2
AJ	A2	5	3
JCAP	A1	5	3
Icarus	B1	1	1
IJMPA	B3	1	1
AdSpR	s/c	3	2
APh	B3	-	-
ApSS	B4		1
RMxAA	B1		1
New Astron	B2	2	1
Nature	A1	2	1
PASP	A2	1	
PhRvC	A2	-	
PhRvL	A1	1	
JphCS		2	
Cos Re			
SoPh		-	
JGRE			
CQGra		1	
AdAst			
AN		1	
Others		12	

Total: 174 papers

83% Qualis A
2% Qualis B
15% Others

Appendix B

Papers published by INCTA researches in 2012

1. AMI Consortium; Hurley-Walker, Natasha; Bridle, Sarah; Cypriano, Eduardo S.; Davies, Matthew L.; Erben, Thomas; Feroz, Farhan; Franzen, Thomas M. O.; Grainge, Keith; Hobson, Michael P.; and 13 coauthors Bayesian analysis of weak gravitational lensing and Sunyaev-Zel'dovich data for six galaxy clusters2012MNRAS.419.2921A
2. Andrade-Santos, Felipe; Lima Neto, Gastão B.; Laganá, Tatiana F. A New Method to Quantify X-Ray Substructures in Clusters of Galaxies2012ApJ...746..139A
3. Fabris, Júlio C.; Pelinson, Ana M.; Salles, Filipe de O.; Shapiro, Ilya L. Gravitational waves and stability of cosmological solutions in the theory with anomaly-induced corrections2012JCAP...02..019F
4. Holanda, R. F. L.; Cunha, J. V.; Lima, J. A. S. New constraints on H_0 and Ω_m from SZE/X-ray data and baryon acoustic oscillations2012GReGr..44..501H
5. Holanda, R. F. L.; Cunha, J. V.; Marassi, L.; Lima, J. A. S. Constraining H_0 in general dark energy models from Sunyaev-Zeldovich/X-ray technique and complementary probes 2012JCAP...02..035H
6. Kepler, S. O.; Pelisoli, Ingrid; Peçanha, Viviane; Costa, J. E. S.; Fraga, Luciano; Hermes, J. J.; Winget, D. E.; Castanheira, Barbara; Córsico, A. H.; Romero, A. D.; and 7 2012ApJ...757..177Kcoauthors

7. Kepler, S. O.; Pelisoli, Ingrid; Peçanha, Viviane; Costa, J. E. S.; Fraga, Luciano; Hermes, J. J.; Winget, D. E.; Castanheira, Barbara; Córsico, A. H.; Romero, A. D.; and 7 coauthorsSeismology of a Massive Pulsating Hydrogen Atmosphere White Dwarf 2012ApJ...757..177K

8. Kim, Taehyun; Sheth, Kartik; Hinz, Joannah L.; Lee, Myung Gyoon; Zaritsky, Dennis; Gadotti, Dimitri A.; Knapen, Johan H.; Schinnerer, Eva; Ho, Luis C.; Laurikainen, Eija; and 14 coauthors
   Early-type Galaxies with Tidal Debris and Their Scaling Relations in the Spitzer Survey of Stellar Structure in Galaxies (S^4G) 2012ApJ...753...43K
9. Kowal, Grzegorz; de Gouveia Dal Pino, Elisabete M.; Lazarian, A.
   Particle Acceleration in Turbulence and Weakly Stochastic Reconnection2012PhRvL.108x1102K
10. La Barbera, F.; Ferreras, I.; de Carvalho, R. R.; Bruzual, G.; Charlot, S.; Pasquali, A.; Merlin, E.
    SPIDER - VII. Revealing the stellar population content of massive early-type galaxies out to $8R_e$ 2012MNRAS.426.2300L
11. La Barbera, F.; Paolillo, M.; De Filippis, E.; de Carvalho, R. R.
    Characterizing the nature of fossil groups with XMM 2012MNRAS.422.3010L
12. Lago, B. L.; Calvão, M. O.; Jorás, S. E.; Reis, R. R. R.; Waga, I.; Giostri, R.
    Type Ia supernova parameter estimation: a comparison of two approaches using

current datasets 2012A&A...541A.110L
13. Lazarian, A.; Vlahos, L.; Kowal, G.; Yan, H.; Beresnyak, A.; de Gouveia Dal Pino, E. M.
Turbulence, Magnetic Reconnection in Turbulent Fluids and Energetic Particle Acceleration 2012SSRv..173..557L
14. Lenzi, C. H.; Lugones, G.
Hybrid Stars in the Light of the Massive Pulsar PSR J1614-2230
2012ApJ...759...57L
15. Lima, J. A. S.; Basilakos, S.; Costa, F. E. M.
New cosmic accelerating scenario without dark energy 2012PhRvD..86j3534L
16. Longmore, Steven N.; Rathborne, Jill; Bastian, Nate; Alves, Joao; Ascenso, Joana; Bally, John; Testi, Leonardo; Longmore, Andy; Battersby, Cara; Bressert, Eli; and 13 coauthors G0.253 + 0.016: A Molecular Cloud Progenitor of an Arches-like Cluster2012ApJ...746..117L
17. Luna, G. J. M.; Diaz, M. P.; Brickhouse, N. S.; Moraes, M.
XMM-Newton EPIC and OM observation of Nova Centauri 1986 (V842 Cen)
2012MNRAS.423L..75L
18. Lv, X. Y.; de Barros, A. L. F.; Boduch, P.; Bordalo, V.; da Silveira, E. F.; Domaracka, A.; Fulvio, D.; Hunniford, C. A.; Langlinay, T.; Mason, N. J.; and 5 coauthors
Implantation of multiply charged carbon ions in water ice 2012A&A...546A..81L
19. Machado, U. D.; Opher, R.Generalized non-commutative inflation 2012CQGra..29f5003M
20. Machuca, J. F.; Carruba, V. Secular dynamics and family identification among highly inclined asteroids in the Euphrosyne region2012MNRAS.420.1779M
21. Magalhaes, Nadja S.; Miranda, Thaysa A.; Frajuca, Carlos
Predicting Ranges for Pulsars' Braking Indices 2012ApJ...755...54M
22. Majaess, D.; Turner, D. G.; Gallo, L.; Gieren, W.; Bonatto, C.; Lane, D. J.; Balam, D.; Berdnikov, L.
Anchoring the Distance Scale via X-Ray/Infrared Data for Cepheid Clusters: SU Cas
2012ApJ...753..144M
23. Majaess, D.; Turner, D.; Moni Bidin, C.; Geisler, D.; Borissova, J.; Minniti, D.; Bonatto, C.; Gieren, W.; Carraro, G.; Kurtev, R.; and 7 coauthors
Strengthening the open cluster distance scale via VVV photometry
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