

Final project report

Project ID: 2003/7.3
Title Astrophysics and Cosmology at millimetre and sub-millimeter wavelengths

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Duration: 3 years
Assigned funding: 60.000,00 Euros

Activities and results

- Final set up and preparation for shipping to Antarctica of MIPOL, 33 GHz polarimeter for studies of the CMB polarization. While (and still) waiting for using it in Antarctica MIPOL has been installed and (still is) at Testa Grigia (3500 m asl, Western Alps).
 - Studies, within a European collaboration, of new generation polarimeters, combining interferometric techniques and bolometric methods of detection.
 - Studies of low noise, cryogenic, detectors for astrophysical observations between 100 and 500 GHz (collaboration with INAF Arcetri and INRIM-Turin). A 90 GHz prototype developed and unit at 220 and 350 GHz bought in Germany and USA.
 - Construction and test at Testa Grigia of a radiometer prototype at 350 GHz
 - Preparation of MASTER, radiometer/spectrometer operating at three frequencies: 90, 220 and 350 GHz
 - Preparation of a facility for observations at Testa Grigia
 - Construction of a mechanical cryostat attached to a Vector Network Analyzer for tests at 4 K of components and systems for astrophysical observations up to 500 GHz.
 - Participation and contribution to national and international meetings on Antarctic Astrophysics
 - Planning and studies of new astrophysical facilities in Antarctica
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Products

A – papers in scientific magazines

- 1) GERVASI M, BANFI S, BOELLA G, PASSERINI A, NATALE V, SIRONI G., TARTARI A, ZANNONI M. (2007). Radiometers based on SIS mixers to measure SZ effect from galaxy clusters. NEW ASTRONOMY REVIEWS. vol. 51, pp. 363-367 ISSN: 1387-6473. - Proc. F.Melchiorri Memorial Meeting - Rome June 2006.
- 2) POLENTA G, SADR P.A.R, BARTLETT J, BRELLE E, CONVERSI L, DE BERNARDIS P, DUFOUR C, GERVASI M, GIARD M, GIORDANO C, GIRAUD-HERAD Y, MAFFEI B, MASI S, MAUSKOPF P, NATI F, ORLANDO A, PETERZEN S, PIACENTINI F, PIAT M, PICCIRILLO L, PISANO G, PONS R, ROSSET C, SAVINI G, SIRONI G., TARTARI A, VENEZIANI M, ZANNONI M. (2007). The BRAIN CMB polarization experiment. NEW ASTRONOMY REVIEWS. vol. 51, pp. 256-259 ISSN: 1387-6473. - Proc. of the F.Melchiorri Memorial Meeting - Rome June 2006.
- 3) SIRONI G., BOELLA G, GERVASI M, TARTARI A, ZANNONI M. (2007). The CMB spectrum: perspective of observing spectral distortions. NEW ASTRONOMY REVIEWS. vol. 51, pp. 406-410 ISSN: 1387-6473. - Proc. F.Melchiorri Memorial meeting - Rome June 2006.
- 4) GERVASI M, BOELLA G, SIRONI G., TARTARI A, ZANNONI M, NATALE V. (2006). Measurement of the Sunyaev-Zel'dovich effect with the SRT. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. Suppl. Vol.10, pp. 175-179 ISSN: 0037-8720.
- 5) OLMI L, PELOSI G, PICCIRILLO L, SARACENO P, SIRONI G., STOREY J.W.V. (2004). ASO: an Antarctic Sumillimeter Observatory. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. Suppl. 5, pp. 368-373 ISSN: 0037-8720.

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- 6) BOELLA G, GERVASI M, PASSERINI A, SIRONI G., TARTARI A, ZANNONI M. (2003). Antarctic activities of the Milano Bicocca Radio Group: a status report. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. Suppl. 2, pp. 65-69 ISSN: 0037-8720.
- 7) CALISSE P.G, DE BERNARDIS P, OLMI L, PICCIRILLO L, SIRONI G., DELABROUILLE J, GERVASI M, GIRAUD-HERAUD Y, LAMARRE J.M, MASI S, MAUSKOPF P, PAJOT F, STOREY J.M.V. (2003). An international center for submillimeter astronomy at Dome C, Antarctica: statement of work. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. Suppl. 2, pp. 62-64 ISSN: 0037-8720.
- 8) SAZHIN M.V, SIRONI G., KHOVANSKAYA O.S. (2003). Separation of foreground and background signals in single frequency measurements of the CMB Polarization. NEW ASTRONOMY. vol. 9, pp. 83-101 ISSN: 1384-1076.
- 9) SIRONI G., BOELLA G, GERVASI M, TARTARI A, ZANNONI M. (2003). Observations at Millimetric and Sub Millimetric Wavelengths from Antarctica : Activity Report. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. 74, pp. 85-88 ISSN: 0037-8720.
- 10) TARTARI A, BOELLA G, CANDOTTI M, GERVASI M, NATALE V, PASSERINI A, SIRONI G., ZANNONI M. (2003). Sunyaev Zeldovich effect studies with MASTER. MEMORIE DELLA SOCIETA' ASTRONOMICA ITALIANA. vol. Suppl. 2, pp. 44-49 ISSN: 0037-8720. also astro-ph/0307166v1.

B – book chapters

- 1) GERVASI M, ZANNONI M, TARTARI A, BOELLA G, SIRONI G. (2006). Coherent systems for the detection of CMB polarization. In: AA.VV. Cosmic Polarization (R.Fabrizi Editor). (vol. ---, pp. 1-43). ISBN: 81-308-0089-6. TRIVANDRUM - 695 023 KERALA: Research Signpost (INDIA).

C - proceedings of international conferences

- 1) POLENTA G, CALVO M, CONVERSI L, DE BERNARDIS P, GIORDANO C, IACOANGELI A, MARINI-BETTOLO C, MASI S, NATI F, NATI L, PETERZEN S, PIACENTINI F, SORDINI R, BARTLETT J, BRELLE E, DUFOUR C, GIRAUD-HERAUD Y, PIAT M, GERVASI M, SIRONI G., TARTARI A, ZANNONI M, MAFFEI B, PICCIRILLO L, ADE P, GEAR W, ORLANDO A, SAVINI G, GIARD M, DUMOULIN L, PAJOT F. (in stampa). The BRAIN experiment. In: Proc. 11th Marcel Grossmann Meeting on General Relativity. Proc. MG11 (Berlin). Berlin. June 2006. (pp. xxx). SINGAPORE: World Scientific. in stampa.
- 2) BURTON M, PICCIRILLO L, ET AL, SIRONI G., ET AL. - THE ASTROPOLE CONSORTIUM. (2006). AstroPoles - Astronomy from the Polar Plateau. In: Astronomy in Antarctica. IAU General Assembly - Prague 2006.
- 3) BOELLA G., GERVASI M., PASSERINI A., SIRONI G., TARTARI A., ZANNONI M., NATALE V. (2005). MASTER: a Radiometer for mm and sub-mm Observations from the Antarctic Plateau. Dome C Astron. & Astroph. Meeting - Toulouse 2004 - EAS Publications Series. (vol. 14, pp. 239-244). ISBN/ISSN: 2-86883-835-9/1633-4760. M.Giard, F.Casoli and F.Paletou Editors
- 4) BOELLA G, DE LUCIA A, GERVASI M, GROSSETTI G, PASSERINI A, SIRONI G., TARTARI A, ZANNONI M. (2005). CMB Polarimetry from the Antarctic Plateau. Dome C Astron. & Astroph. Meeting - Toulouse 2004 - EAS Publications Series. (vol. 14, pp. 263-268). ISBN/ISSN: 2-86883-835-9/1633-4760. M.Giard, F.Casoli and F.Paletou Editors
- 5) MASI S., DE BERNARDIS P., GIORDANO C., NATI F., PIACENTINI F., POLENTA G., VENEZIANI M., GERVASI M., SIRONI G., TARTARI A., ZANNONI M., PETERZEN S., BARTLETT J., GIRAUD-HERAUD Y., PIAT M., ROSSET C., GIARD M., PONS R., MAFFEI B., ADE P., GEAR W., MAUSKOPF P., PICCIRILLO L., PISANO G., SAVINI G. (2005). Precision CMB Polarization from Dome-C: the BRAIN experiment. Dome C Astron. & Astroph. Meeting - Toulouse 2004 - EAS Publications Series. (vol. 14, pp. 87-92). ISBN/ISSN: 2-86883-835-9/1633-4760. M.Giard, F.Casoli and F.Paletou Editors.
- 6) OLMI L., PELOSI G., PICCIRILLO L., SARACENO P., SIRONI G., STOREY J.W.V. (2005). ASO: An Antarctic Submillimeter Observatory. Dome C Astron. & Astroph. Meeting - Toulouse 2004 - EAS Publications Series. (vol. 14, pp. 219-224). ISBN/ISSN: 2-86883-835-9/1633-4760. M.Giard, F.Casoli and F.Paletou Editors.
- 7) SIRONI G. (2005). ACMSA: Antarctic Centre for Millimetre and Sub-millimetre Astrophysics. Highlights of Astronomy. Sidney. (vol. 13, pp. 953-954). ISBN/ISSN: 1-58381-189-3. S.FRANCISCO: ASP (UNITED STATES). IAU General Assembly - Special Session 2 - Astronomy in Antarctica - Sydney July 2003 - (O.Engvold Ed.).
- 9) SIRONI G., BOELLA G, GERVASI M, PASSERINI A, TARTARI A, ZANNONI M. (2005). CMB Observations from the Antarctic Plateau. Highlights of Astronomy. (vol. 13, pp. 969-970). ISBN/ISSN: 1-58381-189-3. S.FRANCISCO: ASP (UNITED STATES). IAU General Assembly - Special Session 2 - Astronomy in Antarctica - Sydney July 2003 - (O.Engvold Ed.).

D – proceedings of national meetings and conferences

- 1) GERVASI M., BOELLA G., SIRONI G., TARTARI A., ZANNONI M., NATALE V. (2005). Measurement of Sunyaev-Zel'dovich effect at SRT. Workshop Scienza con il Sardinia Radiotelescope, Bologna (10-11 Maggio 2005) - Mem.S.A.It. (vol. 75, pp. 282).

E – thematic maps

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F – patents, prototypes and data bases

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G – exhibits, organization of conferences, editing and similar

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H - formation (PhD thesis, research fellowships, etc.)

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Research units

Milano – Physics Dept

Giorgio Sironi, Giuliano Boella, Massimo Gervasi, Mario Zannoni, Andrea Tartari, Andrea Passerini, Alessandro Bau', Stefano Banfi, Antonio De Lucia

Firenze – INAF Arcetri

Enzo Natale

Torino – INRIM (former Galileo Ferraris)

Vincenzo Lacquaniti, Luciano Brunetti

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Notes