# Short presentation of an expertise profile for the 5th call Space in FP7

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***Bulgaria (SSTRI-BAS)***

FP7 Space NCP Network

COSMOS Matchmaking Event
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# Draft Call Topics that we are interested in

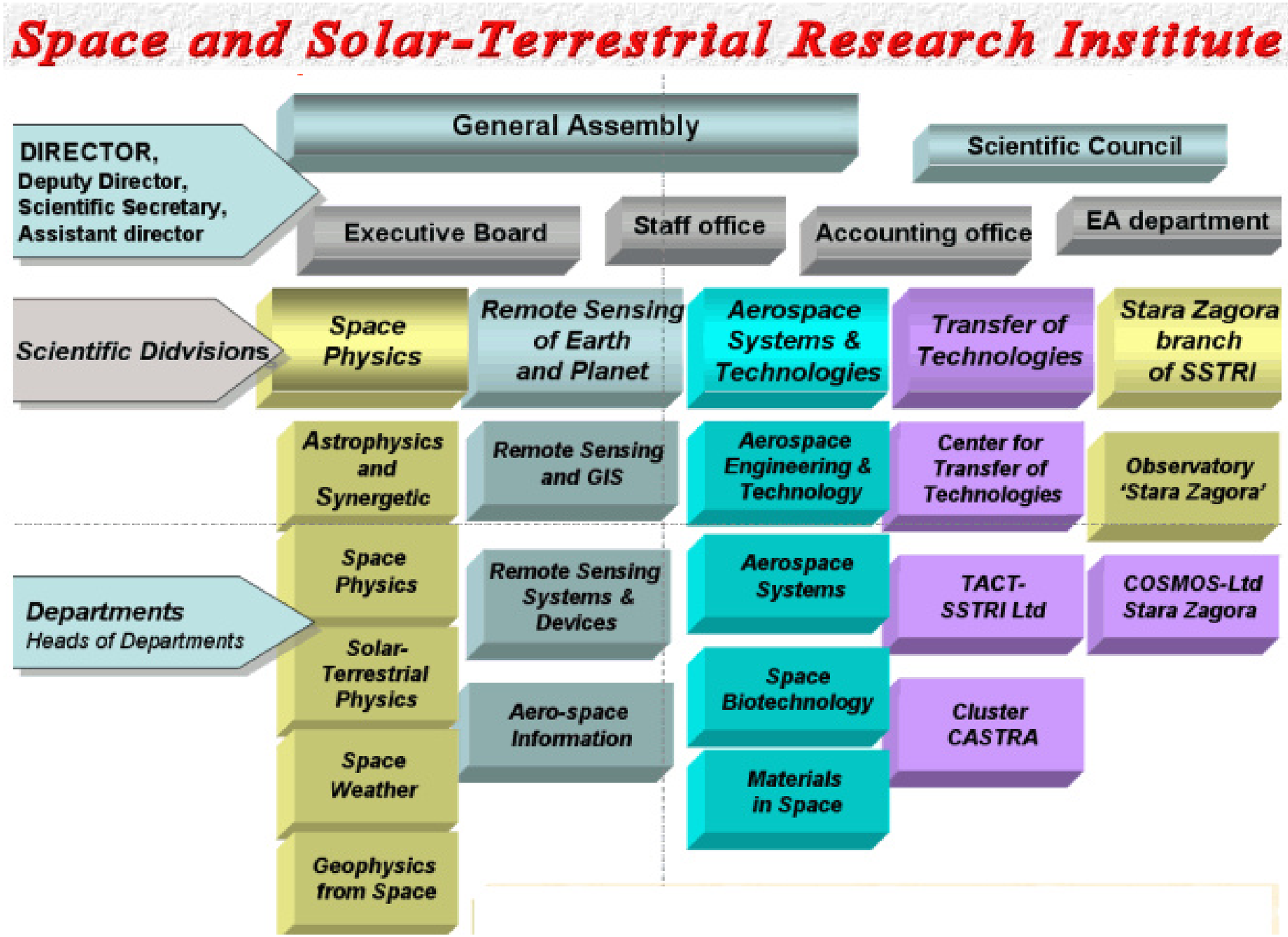
## Strengthening the foundations of Space science and technology (SSF)

- **Research to support space science and exploration.**
  - **Exploitation of space science and exploration data.**
  - **Research to support space transportation and key technologies**

# Presentation of the Solar-Terrestrial Physics Department, Space and Solar-Terrestrial Research Institute at the Bulgarian Academy of Sciences

- **Structure of the Space and Solar-Terrestrial Research Institute (SSTRI-BAS).**
- **Short history of the Solar-Terrestrial Physics Department.**
- **Experience with the EU Framework Programme of the Solar-Terrestrial Physics Department.**

# Structure


Space and Solar-Terrestrial Research Institute
DIRECTOR,
Deputy Director,
Scientific Secretary,
Assistant director
General Assembly
Scientific Council
Executive Board
Staff office
Accounting office
EA department
Scientific Didvisions
Space Physics
Remote Sensing of Earth and Planet
Aerospace Systems & Technologies
Transfer of Technologies
Stara Zagora branch of SSTRI
Astrophysics and Synergetic
Remote Sensing and GIS
Aerospace Engineering & Technology
Center for Transfer of Technologies
Observatory 'Stara Zagora'
Departments
Heads of Departments
Space Physics
Solar-Terrestrial Physics
Space Weather
Geophysics from Space
Remote Sensing Systems & Devices
Aero-space Information
Aerospace Systems
Space Biotechnology
Materials in Space
TACT-SSTRI Ltd
Cluster CASTRA
COSMOS-Ltd Stara Zagora

# Short history of the Solar-Terrestrial Physics Department

The Solar-Terrestrial Physics Department is formed of scientists with large expertise in space research, who participated in many space experiments in the field of Solar –Terrestrial Physics on INTERCOSMOS series of rockets and satellites, the Bulgaria –1300 space research project, and in the scientific program of the second Bulgarian cosmonaut. Since 1990 they participate in **space experiments, including development of instruments, data processing and interpretation** for international **space projects:** APEX, INTERBALL, Mars-96 interplanetary probe, BION-12 satellite, and International Space Station (ISS), NATO contracts, as well as number of contracts with the National Scientific Fund.

**Current projects**

**Space radiation investigation experiments** in the **facilities BIOPAN, EXPOSE, MATROSKA-R for ISS Columbus module and Russian segment of ISS**, **Foton** and **BION-1M satellites, Indian Moon satellite CHANDRAYAAN–1, NASA Deep Space Test-Bed Facilities and Phobos-Grunt interplanetary probe.**

**18 agreements** with scientific organisations from Germany, Norway, Czech Republic, Italy, Russia, Japan, USA.

# Experience of the Solar-Terrestrial Physics Department with the EU Framework Programme

- **Contract of 5FP HPCF-CT-2001-00230**

" Plasma Processes in Near Earth Space, INTERBALL and Beyond“ - contractor;

- **Contract of 5FP ICA1-CT-2002-60002** -coordinator;
- **SSA project START of 6FP, 2004-2006** -coordinator**;**
- **Experimental Investigation of Radiation Dose Distributions onboard ISS for Estimation of the Radiation Risk in Long Duration Space Flights -in response to ESA and FP6 SURE ANNOUNCEMENT OF OPPORTUNITY -2006** coordinator**;**
- **JRP ULISSE of 7FP, 2009-2012** (subcontractor).

# Competencies

- **List of competencies on the basis of the recent work programme Space**
- **Activity 9.2. Strengthening Space Foundations:**
  - **Area 9.2.1: Research to support space science and exploration- Space science and exploration data exploitation.**
  - **Area 9.2.2: Research to support space transportation and key technologies.**

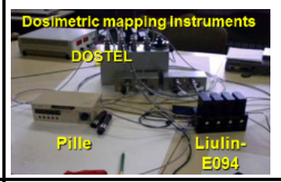
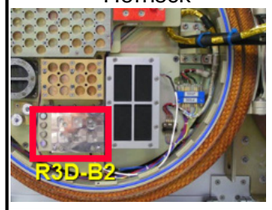
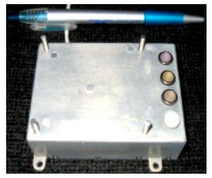
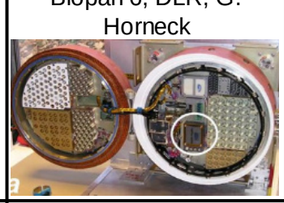
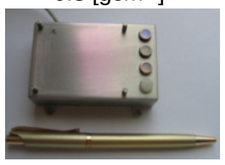
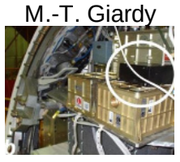
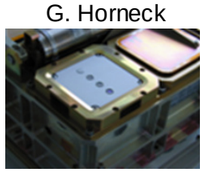
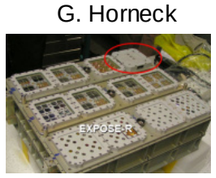
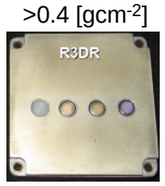
**Particularly:**

- **Develop space radiation measurement instrumentation;**
- **Provide space radiation and Solar-Terrestrial Physics data;**
- **Space radiation and Solar-Terrestrial Physics data exploitation .**

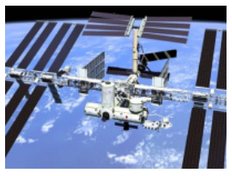
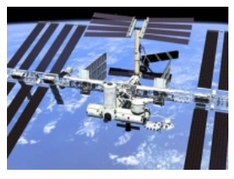
***Available data sets from:***

- ✓ ***Space radiation measurement experiments on manned Mir space station and ISS, unmanned satellites Foton and BION-1M, Moon satellite CHANDRAYAAN–1 . The data available cover the time periods 1989-1994 and 2000- up to now (Please see Table 1 and Table 2). New data are expected from current and planned new experiments.***
- ✓ ***Space radiation measurements on aircrafts (2001-2009).***
- ✓ ***Mountain peaks radiation measurements (2005-2011).***
- ✓ ***Solar-Terrestrial Physics data from INTERBALL space project-for the period 1995-2000.***

# Table 1 . Available space radiation data in SSTRI-BAS obtained during ESA satellite experiments

| Satellite | Experiment Principal Investigator | Data From-To, Available data points [Number] | Instrument, Place, Shielding [gcm$^{-2}$] | Minimum energy [MeV] Protons/Electrons | Resolution [sec] | Available data, Organization, Scientist resp. for the analysis | References of published papers |
|---|---|---|---|---|---|---|---|
| **ISS** | Dosimetric Mapping, DLR, G. Reitz   | 05/05/2001-26/08/2001 1,267,200 | Liulin-E094, 4 MDU inside of American Lab. >20 [gcm$^{-2}$]  | 148/48 | 30 | Spectra in 256 channels, Dose/Flux, SSTRI-BAS, Ts. Dachev | 1. Reitz, et al., RPD, 116, 374-379, 2005. http://rpd.oxfordjournals.org/cgi/content/abstract/116/1-4/374; 2. Dachev, ASR, 44, 1441-1449, 2009.doi:10.1016/j.asr.2009.08.007; 3. Nealy et al., ASR, 40, 1593-1610, 2007. doi:10.1016/j.asr.2006.12.030; 4. Slaba et al. ASR, 47, 600-610, 2011. doi:10.1016/j.asr.2010.10.021 |
| **Foton M2** | Biopan 5, DLR, G. Horneck   | 01/06/2005-12/06/2005 17,280 | R3D-B2,1 DU outside 1.75 [gcm$^{-2}$]  | 36/2.8 | 60 | Spectra in 256 channels, Dose/Flux, SSTRI-BAS, Sofia Ts. Dachev UV-A/B/C, PAR, DB-FAU, Erlangen D-P. Häder | 1. Dachev, et al., Proceedings, 171-174, Sofia , 2005. http://www.stil.bas.bg/11conf/Proc/171-174.pdf 2. Häder, et al., ASR, 43, 8, 1200-1211, 2009. doi:10.1016/j.asr.2009.01.021 3. Spurny F., and T.P. Dachev, Acta Geophysica, 57, 1, 125-140, 2009. DOI: 10.2478/s11600-008-0070-6 |
| **Foton M3** | Biopan 6, DLR, G. Horneck  | 14/09/2007-26/09/2007 18,720 | R3D-B3, 1 DU outside 0.8 [gcm$^{-2}$]  | 24/1.4 | 60 | Spectra in 256 channels, Dose/Flux SSTRI-BAS, Sofia Ts. Dachev UV-A/B/C, PAR, DB-FAU, Erlangen D-P. Häder | 1. Dachev, et al., ASR, 44, 1433-1440, 2009. doi:10.1016/j.asr.2009.09.023 3. Damasso et al., Radiation Measurements, 44, 3, 263-272, 2009. doi:10.1016/j.radmeas.2009.03.007 |
| **Foton M3** | PHOTO-II, M.-T. Giardy  | 14/09/2007-26/09/2007 27,360 | Liulin-Photo, inside >5.0 [gcm$^{-2}$]  | 66/8.4 | 60 | Spectra in 256 channels, Dose/Flux IC-AR, Rome, M.-T. Giardy | 1. Damasso et al., Proceedings, 159-162, 2008. http://www.stil.bas.bg/FSR/PDF/TOP1Damasso_Mario2211822r.pdf 2. Damasso et al., Radiation Measurements, 44, 3, 263-272, 2009.doi:10.1016/j.radmeas.2009.03.007 |
| **ISS** | EXPOSE-E, DLR, G. Horneck  | 17/02/2008-03/09/2009 4,406,400 | R3DE 1 DU outside >0.4 [gcm$^{-2}$]   | 16/0.8 | 10 | Spectra in 256 channels, Dose/Flux SSTRI-BAS, Sofia Ts. Dachev UV-A/B/C, PAR, DB-FAU, Erlangen D-P. Häder | 1. Horneck et al., Proceedings ESTEC, Noordwijk, 16-18 November 1998, SP-433, pp. 459-468, 1999. 2. Häder and Dachev, Surveys in Geophysics 24, 229-246 (2003). 3. Dachev, ASR, 44, 1441-1449, doi:10.1016/j.asr.2009.08.007 |
| **ISS** | EXPOSE-R, DLR, G. Horneck   | 15/03/2009-27/01/2011 3,540,000 | R3DR 1 DU outside >0.4 [gcm$^{-2}$]   | 16/0.8 | 10 | Spectra in 256 channels, Dose/Flux SSTRI-BAS, Sofia Ts. Dachev UV-A/B/C, PAR, DB-FAU, Erlangen D-P. Häder | 1. Horneck et al., Proceedings ESTEC, Noordwijk, 16-18 November 1998, SP-433, pp. 459-468, 1999. 2. Häder and Dachev, Surveys in Geophysics 24, 229-246 (2003). 3. Dachev, ASR, 44, 1441-1449, doi:10.1016/j.asr.2009.08.007 |

# Table 2. Available space radiation data in SSTRI-BAS obtained during other satellite experiments

| Satellite | Experiment Principal Investigator | Data From-To Available data points [Number] | Instrument, Place, Shielding [$gcm^{-2}$] | Minimum energy [MeV] Protons/Electrons | Resolution [sec] | Available data, Organization, Scientist resp. for the analysis | Published papers |
|---|---|---|---|---|---|---|---|
| **Chandrayaan-1**<br>  | RADOM,<br>STII-BAS,<br>Ts. Dachev | 22/10/2008-<br>29/09/2009<br><br>1,209,600 | RADOM,<br>1 DU outside of the satellite<br>  | 16/0.8 | 10/30 | Deposited energy spectra in 256 channels,<br>Dose/Flux<br>STII-BAS, Sofia<br>Ts. Dachev | 1. Dachev, et al., Current Science, 96, 4, 544-546, 25 February 2009. http://www.ias.ac.in/currsci/feb252009/544.pdf<br>2. Dachev, et al., Planetary Science Conference, The Woodlands, Texas, USA, March 2-27, 2009. http://www.lpi.usra.edu/meetings/lpsc2009/pdf/1274.pdf |
| **ISS**<br>  | Liulin-MKS<br>IMBP<br>V. Petrov<br>STII-BAS,<br>Ts. Dachev | 13/08/2008-<br>29/08/2008<br>Service system in next 15 years<br><br>149,760 | 4 MDU >20 [$gcm^{-2}$]<br>  | 148/48 | 30 | Deposited energy spectra in 256 channels,<br>Dose/Flux<br>STII-BAS, Sofia<br>Ts. Dachev | 1. Benghin, et al., WRMISS-9, 2004. http://wrmiss.org/workshops/ninth/calibration/benghin.pdf<br>2. Dachev, et al., Proceedings, 195-198, Sofia , 2005.http://www.stil.bas.bg/11conf/Proc/195-198.pdf |
| **ISS**<br>  | Matroska-R<br>IMBP<br>V. Petrov<br>STII-BAS,<br>J. Semkova<br>  | 28/05/2007-<br>18.06.2010<br><br>1,294,400 | Liulin-5, Dosimetric telescope of 3 detectors,<br>Inside PIRS module<br>>20 [$gcm^{-2}$]<br>  | 200/100 | 20/90 | Energy deposition spectra in the range 0.2<br>— 63 MeV in 512 channels.,<br>Dose/Flux, LET spectra, Q-factor<br>STII-BAS, Sofia<br>J. Semkova | 1. Semkova, et al., ASR, 40, Pages 1586-1592, 2007. doi:10.1016/j.asr.2007.01.008<br>2. Semkova, et al., ASR, 45, Issue 7, (2010), 858-865, doi:10.1016/j.asr.2009.08.027 |

# Intended Role in a Consortium

- partner
  - Work package Space radiation data leader

# Contact and further information

- **Address data of the persons to contact:**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- **Relevant links / references**

**http://www.stil.bas.bg/**

- **Relevant References**

**Please see references in the last columns in Table 1 and Table 2.**