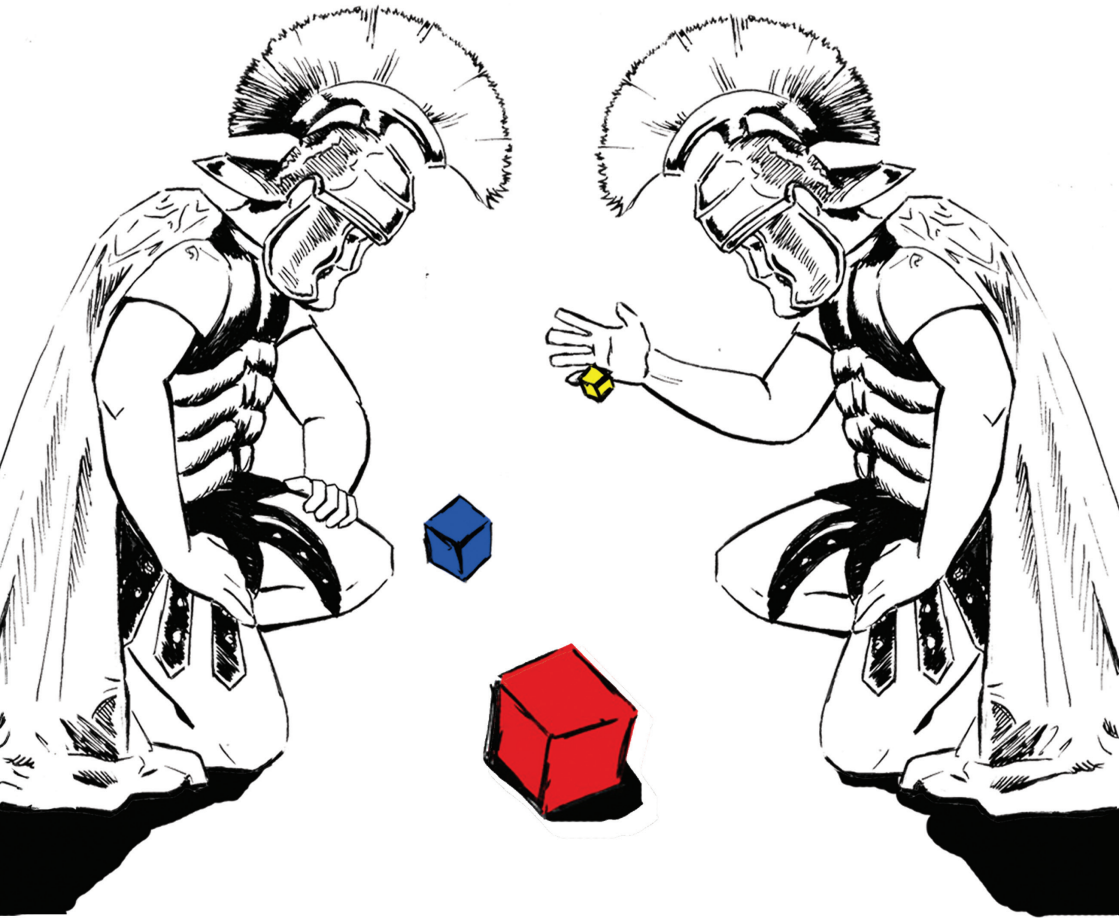
2nd IAA Conference on University Satellite Missions and Cubesat Workshop

February 4th - 9th, 2013
"Villa Spada" centro logistico
della Guardia di Finanza
Roma, Italy



Monday 4th February 2013

Opening Ceremony

09.30 – 09.40 *Welcome address of Academic, Military, and Political Authorities*

Filippo GRAZIANI, IAA Member, GAUSS Srl, Conference Chairman
Carmine GIORDANO, Comandante Centro Logistico Guardia di Finanza
Cristiano BONELLI, Presidente IV Municipio Comune di Roma
Paolo TEOFILATTO, IAA Member, Università degli Studi "La Sapienza" (SIA)

Chairman: **Giorgio Di Bernardo Nicolai**

09.40 – 10.30 ***Opening Lectures:***

Jean-Michel CONTANT, General Secretary of IAA
The International Academy of Astronautics and the young generations
Robert J. TWIGGS, Morehead State University
Is Space Research now ready to return significant benefits that can greatly impact World Health?

10.30 – 10.45 Coffee Break

10:45 – 11.00 ***Invited Lecture:***

Nazzareno MANDOLESI, ASI, E-GEOS
The Italian Space Strategy: a pillar for Europe in Space

11.00 – 13.00 ***Technical Session I: University Space Missions Overview and New Perspectives***

Chairman: Amalia ERCOLI FINZI, IAA Member, Politecnico di Milano Emeritus

IAA-CU-13-01-01
Monitoring Desertification in Badra area Eastern Iraq Using Remote Sensing Data - A. A. Al-A'araage - Iraqui Ministry of Science and Technology

IAA-CU-13-01-02
Future satellite missions and educational training about space science in Uganda: S. Colafranceschi, C. Cappelletti, F. Graziani - GAUSS Srl

IAA-CU-13-01-03
Microsatellite Condor Unam-Mai - S. de la Rosa Nieves, O. M. Brekhov, S. D. Santillán Gutiérrez, C. R. Fuentes, J. A. Ramírez Aguilar - Universidad Nacional Autónoma de México

IAA-CU-13-01-04
Nanosatellite Activities at TU Berlin - M. F. Barschke, Z. Yoon, S. Roemer, K. Brieß - Technische Universität Berlin, Astro-und Feinwerktechnik Adlershof GmbH

IAA-CU-13-01-05
Overview of UniSat-5 mission and concept - C. Cappelletti, F. Graziani - GAUSS Srl

IAA-CU-13-01-06
European Student Earth Orbiter: ESA's Educational Microsatellite Program - P. Tortora, D. Bruzzi, F. Giulietti, P. Galeone - University of Bologna, ALMASpace, ESA

IAA-CU-13-01-07
Technology Preparation for Networked, Distributed Pico-Satellite Systems - K. Schilling - Julius-Maximilians-University Wuerzburg

IAA-CU-13-01-08
Satellite project Quetzal Unam-Mit - S. de la Rosa Nieves, S. D. Santillán Gutiérrez, C. R. Fuentes, J. A. Ramírez Aguilar, E. Sánchez Medina, P. Lozano, A. Saenz-Otero, M. Grutter de la Mora, J. Prado Molina - Universidad Nacional Autónoma de México

13.00 – 14.00 Lunch

14.00 – 14.30 ***Invited Lecture:***

Heiner KLINKRAD, IAA Member, European Space Agency (ESA)

CubeSats and Space Debris

14.30 – 16:15 ***Technical Session II: Space Debris***

Chairman: Heiner KLINKRAD, IAA Member, European Space Agency (ESA)

IAA-CU-13-02-01
Using Apex II for Space Debris Image Analysis - V. Kouprianov, I. Molotov - Central (Pulkovo) Observatory; KIAM

IAA-CU-13-02-02
Conceptual Design Of De-Orbit And Re-Entry Modules For Standard Cubesats- V. Carandente, R. Savino - Università di Napoli Federico II

IAA-CU-13-02-03
A Satellite system for Space Debris monitoring – R. Di Roberto, C. Cappelletti, F. Graziani- GAUSS Srl

IAA-CU-13-02-04
STARS-II Space Verification Experiment for Future Debris Removal Mission - A. Uchida, M. Nohmi - Kagawa University

IAA-CU-13-02-05
Small Satellite to Identify Damage on Upper Stage before Space Debris Removal Mission - C. Massimiani, M. Lavagna - Politecnico di Milano

IAA-CU-13-02-06
A CubeSat de-orbiting and re-entry experiment - R. Pinho, A. Corte-Real, S. Cunha, R. Mendes - University of Porto

16.00 – 16.15 Coffee Break

16.15 – 18.00 ***Technical Session III: Scientific and Technological Payloads***

Chairman: Paolo TEOFILATTO, IAA Member, Università degli Studi "La Sapienza"

IAA-CU-13-03-01
The NANOSATC-BR1 Scientific Payload: Magnetometer System - J. P. Marchezi, O. MendesJr, C. M. De Nardin, N. B. Trivedi, O. C. Durão, N. J. Schuch - Centro Regional Sul de Pesquisas Espaciais

IAA-CU-13-03-02
Fully Integrated Lab-On-Chip Systems For Space Missions - D. Caputo, G. de Cesare, A. Nascetti, R. Scipinotti - Sapienza Università di Roma

IAA-CU-13-03-03
Adaptation of Cubesat Technology for the International Space Station - M. Buhl, B. Monna, T. Segert - Berlin Space Technologies GmbH

IAA-CU-13-03-04
Tensegrity architecture for small satellites deployable structures V. S. Zolesi, P. L. Ganga, L. Scolamiero, A. Micheletti, P. Podio-Guidugli, G. Tibert, A. Donati, M. Ghiozzi - Kayser Italia, ESA Estec, TorVergata, KTH Stockholm

IAA-CU-13-03-05
Development, testing and integration of an experimental, low cost solar array for the UniSat-5 microsatellite - S. Gregucci, P. Pergola, S. Marcuccio - ALTA Space

IAA-CU-13-03-06
Camera Payload Design Limitations and Solutions for Earth Imaging and Observations in CubeSats - H. O. Almubarak, A. S. Eltayeb, M. A. Elhassan - University of Khartoum

IAA-CU-13-03-07
Design and realization of low cost equipment for in-space testing and characterization of solar cells - A. Ceci, P. Pergola, S. Marcuccio - ALTA Space

Tuesday 5th February 2013

9.30 – 11.00 ***Special Session:*** ***Launch Systems and New Launch Opportunities***
Chairman: Filippo GRAZIANI, IAA Member, GAUSS Srl President

9.30-10.00 **Dr. Vladimir A. Andreev**, IAA Member, President of ISC Kosmotras
Participation of Small University Satellites and Cubesats in Dnepr cluster launch missions
10.00-10.05 **Sergii Zasukha,** Ukraine Space Agency Deputy Head
10.05-10.30 **Vladislav Solovey,** Alcantara Cyclone Space Brazil
Cyclone-4 LV capability to launch the microsatellites as piggyback payloads,
10.30-11.00 **Yuichiro Nogawa** - Japan Manned Space Systems Corporation (JAMSS)
Overview of Satellite Deployment Mission from JEM to Provide an Opportunity For Small Satellite/Cubesat Users

11.00 – 11.15 Coffee Break

11.15 – 13.15 ***Technical Session IV:*** ***Space Environment***
Chairman: Carlo ULIVIERI, IAA Member, Università degli Studi "La Sapienza"

IAA-CU-13-04-01
The Cosmic X-Ray Background NanoSat-2 (CXBN-2): An Improved Measurement of the Cosmic X-Ray Background - K. Brown, B. Malphrus, G. Jernigan - Morehead State University
IAA-CU-13-04-02
The NANOSATC-BR2' Langmuir Probe- A. V. Bilibio, M. B. Stefanello, C. S. Maschado, A. A. Pimenta, O. C. Durão, N. J. Schuch- Universidade Federal de Santa Maria
IAA-CU-13-04-03
BIOCUBE: a new Experiment Unit for biomedical research in space- M. Vukich, A. Donati, V. Zolesi- Kayser Italia
IAA-CU-13-04-04
Correction of faults and errors induced by cosmic radiation on operation system level in CubeSats- K. A. Ødegaard, R. Birkeland, A. Skavhaug- Norwegian University of Science and Technology
IAA-CU-13-04-05
Smaller Spacecraft For Flying Large Clusters Of Biological Space Experiments - B. Twiggs, J. Healea, T. Miller, D. Demoss, L. Harvey, A. Zubair- Morehead State University, Kennedy Space Center, Mayo Clinic
IAA-CU-13-04-06
Hot Down Cool up Effect- E. K. S. Krarrar, S. M. A. Ahmed- University of Khartoum Sudan
IAA-CU-13-04-07
The Importance of a Dosimeter in the NANOSATC-BR2 - V. Deggeroni, T. Bremm, E. Echer, A. Dal Lago, O. C. Durão, N. J. Schuch- Universidade Federal de Santa Maria
IAA-CU-13-04-08
Network of Small Satellites for High Energy Observations of Terrestrial Gamma-Ray Flashes- N. Vedenkin, G. Garipov, A. Chernenko, A. Pozanenko - Skobeltsyn Institute of Nuclear Physics of MSU

13.15 – 14.15 Lunch

14.15 – 14.45 ***Invited Lecture:***
Michael OVCHINNIKOV, IAA Member, Keldysh Institute of Applied Mathematics (KIAM)
Attitude Control Systems for Cubesats. Approaches and Methodology

14.45 – 16.00 ***Technical Session V:*** ***Attitude Determination Control Systems***

Chairman: Michael OVCHINNIKOV, IAA Member, Keldysh Institute of Applied Mathematics (KIAM)

IAA-CU-13-05-01
TigriSat Attitude Control System - P. Testani, P. Teofilatto, A. Nascetti, M. Truglio – Sapienza University of Rome

IAA-CU-13-05-02
Three-axis Attitude Control using only Magnetorquers for a Sun-Pointing Microsatellite - A. Mauta, F. Curti - Sapienza University of Rome.

IAA-CU-13-05-03
Three-axis magnetic attitude control asymptotic study - D. Roldugin, M. Ovchinnikov, V. Penkov - KIAM

IAA-CU-13-05-04
Attitude Determination System for Very Small Satellites Using Data Fusion - V. Capuano - Sapienza University of Rome.

IAA-CU-13-05-05
Active magnetic attitude stabilization for Quetzal project- R. Reyes-Morales, S. D. Santillan-Gutierrez, J. Prado-Molina, C. Romo-Fuentes, J. A. Ramirez-Aguilar- Universidad Nacional Autónoma de México

16.00-16.30 Coffee Break

16.30 – 18.00 ***Technical Session VI:*** ***Ground Segment***

Chairman: Fernando AGUADO AGELET, University of Vigo

IAA-CU-13-06-01
Satellite Tracking Software- A. A. Yassin, M. E. Babiker - University of Khartoum

IAA-CU-13-06-02
Development of a distributed ground segment for multi-mission satellite operations - T. Funke, S. Jahnke, P. Werner, S. Trowitzsch, K. Brieß - Technische Universität Berlin

IAA-CU-13-06-03
Design, Implementation and Impact of Educational Satellite Ground Station, Case Study: University of Khartoum, Sudan- A. S. Eltayeb, H. O. Almubarak, M. A. Elhassan- University of Khartoum

IAA-CU-13-06-04
CubeSat Communication and Deployment Enabling Capabilities at Morehead State University and NASA Goddard Space Flight Center, Wallops Flight Facility - S. H. Schaire, B. K. Malphrus - NASA Goddard Space Flight Center

IAA-CU-13-06-05
Regulatory aspects for nano and picosatellites - E. D'Andria- Amsat Italy

20:30 Dinner in a typical Italian restaurant

Wednesday 6th February 2013

CubeSat Workshop

CubeSat Workshop Opening Lectures:

9.30-9.55 **Rainer SANDAU**, IAA Member and Technical Director
Quo Vadis: Small Satellites/CubeSats

9.55-10.20 **Jordi PUIG-SUARI**, CalPoly San Louis Obispo Professor
CubeSats and New Generations

10.20 – 10.45 Coffee Break

10.45 – 13.00 ***Technical Session VII: CubeSat Missions***

Chairman: Benjamin K. MALPHRUS, Morehead State University

IAA-CU-13-07-01

1st Cubesat Deployment From Japanese Experimental Module Of International Space Station- S. Imai,Y. Nogawa, K. Imaki - Japan Manned Space Systems Corporation

IAA-CU-13-07-02

CubeSat «PolyITAN-1» with Honeycomb Paneled Frame - B. Rassamakin, N. Buyskov, S. Ostapchuk. S.Khairnasov, N. Pershin, V. Khominych , D. Smakovsky , A. Rassamakin ,Ye. Kovalenko, Y. Ostrovsky - Kyiv Polytechnic Institute

IAA-CU-13-07-03

Mission analysis: Qualifying three equipment in one Cubesat mission - J. Grave, W. Lucas, P. Peille, A. Rouanet-Labe, S. Lizy-Destrez - SUPAERO

IAA-CU-13-07-04

Cubesat-Based Network for Earthquake Data Collection and Energy-Related Constraints- I. Meziane-Tani, A. Deschamps, G. Metris, M. Bekhti, F. T. Bendimerad- University of Tlemcen, Nice Sophia-Antipolis University, Centre de Techniques Spatiales

IAA-CU-13-07-05

Fempto-Satellite Mission Engineering - Yevgeniy Byeloborodov, K. Brown, B. Twiggs, B. Malphrus, J. Helea - Morehead State University, Kyiv Polytechnic Institute

IAA-CU-13-07-06

Conceptual Design Of Small Spacecraft Docking Mechanism Actuated By Electroactive Polymers - L. Olivieri, F. Branz, L. Savioli, A. Francesconi - CISAS

IAA-CU-13-07-07

Δdsat A Qb50 Cubesat To Study Rarefied-Gas Drag Modelling - J. Virgili - Cranfield

IAA-CU-13-07-08

Improving the Measurement of the Diffuse X-Ray Background Through Cubesat Missions - R. McNeil, B. Malphrus, J. Kruth, K. Brown, G. Jernigan - Morehead State University

IAA-CU-13-07-09

Scientific and Technological Payloads Aboard the B3LSat CubeSat of the QB50 Network - L. Dell'Elce, G. Kerschen, T. Delabie, D. Vandepitte, K. Fleury, J.H. Lecat, T. Walewyns, L. A. Francis - Université de Liège, Belgium, Katholieke Universiteit Leuven, Belgium Centre Spatial de Liège, Belgium

13.00 – 14.00 Lunch

14.00 – 14.30 ***Invited Lecture:***

Piero GALEONE, European Space Agency

ESA Education Office perspectives for future CubeSat initiatives

14.30 – 16.30 ***Technical Session VIII: CubeSat Activities and Concepts (I)***

Chairman: Klaus SCHILLING, IAA Member, Wurzburg University

IAA-CU-13-08-01

ABACUS Advanced Board For Active Control Of University Satellites - A. Nascetti, D.L. Pancorbo-D'Ammando, M. Truglio - Sapienza University of Rome

IAA-CU-13-08-02

Design of a reliable OBC for Aalto-1 nanosatellite mission - E. Razzaghi, A. Yanes, J. Praks, M. Hallikainen - Aalto University

IAA-CU-13-08-03

Educational Aspects Of A Cubesat Project - R. Birkeland, O. Gutteberg - Norwegian University of Science and Technology

IAA-CU-13-08-04

Dynamic Separation In Air Launch: A Model - P. Cafarella, P. Teofilatto, A. Minotti- University of Roma Sapienza

IAA-CU-13-08-05
The Brazilian Inpe-Ufsm Nanosatc-Br Cubesat Program - N. J. Schuch, O. C. Durão - Centro Regional Sul de Pesquisas Espaciais
IAA-CU-13-08-06
A new CubeSat Deployer Concept: PEPPOD - G. Martinotti, C. Cappelletti, F. Graziani, A. Al Lihabi.- GAUSS Srl
IAA-CU-13-08-03
Android smarthphone as an OBC - S. Y. Mohamed, Y. M. Osman - University of Khartoum

16:15 – 16:30 Coffee Break

16.30 – 18.00 ***Technical Session IX:*** ***CubeSat Activities and Concepts (II)***
Chairman: Sabrina CORPINO, Politecnico di Torino

IAA-CU-13-09-05
Lessons Learned From The Picosatellite Mission Beesat-2 - S. Trowitzsch, F. Baumann, K. Brieß - Technische Universität Berlin
IAA-CU-13-09-06
Small Satellite And Cubesat Missions: Ten Years Of Activities at Politecnico Di Torino - S. Corpino, S. Chiesa, F. Stesina, N. Viola - Politecnico di Torino
IAA-CU-13-09-07
Driving CubeSat Requirements for the QB50 Project - J. Muylaert, R. Reinhard, C. O. Asma, F. Singarayar - Von Karman Institute
IAA-CU-13-09-08
Delfi-n3Xt: a Powerful Triple-unit Cubesat for Education and Technology Demonstration - J. Bouwmeester, C.A.H. Schuurbiers, F. Stelwagen, M. Tijssen, E. Timmer - Delft University of Technology
IAA-CU-13-09-09
Overview of the NUTS CubeSat Project - R. Birkeland, O. Gutteberg - Norwegian University of Science and Technology
IAA-CU-13-09-10
Micro-Cathode Arc Thruster for Cube Satellite Propulsion - M. Keidar - George Washington University

Thursday 7th February 2013

9.00-10.00 ***Invited Lectures:*** ***CubeSats Constraints and Communications***

9.00-9.30 **Benjamin K. MALPHRUS**, Morehead State University
Space Communications Systems For Nanosatellite Missions At Morehead State University

9.30-10.00 **Cheun Chern LOO,** SPR Division ITU
Regulatory aspects for nano-satellites and pico-satellites

10.00 – 10.45 ***Technical Session X:*** ***CubeSat Subsystems-AODCS (I)***
Chairman: Kevin BROWN, Morehead State University

IAA-CU-13-10-01
A Combined Attitude Magnetic Controller for Remote Sensing Satellite - A. Farrag, A. El-Raffie, A. Bahgat - Egyptian Space Program; Cairo University
IAA-CU-13-10-02
Design of a low-power GPS subsystem for a nanosatellite science mission – H. Leppinen, A. Kestilä,, M. Ström, M. Komu, M. Hallikainen - Aalto University

IAA-CU-13-10-03
Aerostability for low altitude flying CubeSats - J. Virgili - Cranfield

10:45 – 11.00 Coffee Break

11.00 – 13.15 ***Technical Session XI:*** ***CubeSat Subsystems-AODCS (II)***
Chairman: Fabio CURTI, Sapienza, University of Roma

IAA-CU-13-11-01
Hardware in the Loop Ground Verification Strategies for Cubesat ADCS systems based on single axis Air Bearing and Helmholtz Cage - T. Segert - Berlin Space Technologies GmbH
IAA-CU-13-11-02
The active attitude determination and control system for e-st@r-2 - F. Stesina, S. Corpino, R. Mozzillo - Politecnico di Torino
IAA-CU-13-11-03
Project of the Analog Two-axis Sun Sensor for Second Polish Students' Satellite PW-Sat 2 - Inna Uvarova - Warsaw University of Technology
IAA-CU-13-11-04
High Agility Pointing Capabilities using SSBV cubesat ADCS system- M. Pastena, J. Barrington - Brown - SSBV Aerospace & Technology Group
IAA-CU-13-11-05
Testbed for CubeSat Propulsion System Control Algorithms- J. Bader, A. Broucek, Z. Cuseo, A. Sung-Hoon Kim, M. Opland, S. Smith, M. Trowbridge, W. Ryder Whitmire - University of Colorado
IAA-CU-13-11-06
Using independent combinations of CubeSat solar panels as sun sensors for separating inbound sunlight information - M. Nygren, R. Birkeland, J. T. Gravdahl - Norwegian University of Science and Technology
IAA-CU-13-11-07
Attitude Determination and Control System implementation for the Aalto-1 nanosatellite - T. Tikka, B. Danziger, S. Engelen, M. Hallikainen - Aalto University

13.15 – 14.00 Lunch

14.00 – 16.30 ***Technical Session XII:*** ***CubeSat Design and Payload***
Chairman: Chantal CAPPELLETTI, IAA Corresponding Member, G.A.U.S.S. Srl CEO
IAA-CU-13-12-01
The Design of a Drag-Free CubeSat and the Housing for its Gravitational Reference Sensor- C. Zanoni, A. Alfauwaz, A. Aljadaan, S. Althubiti, K. Balakrishnan, S. Buchman, R. L. Byer, J. W. Conklin, G. D. Cutler, D. DeBra, E. Hultgren, J. A. Lipa, S. Saraf, A. Zoellner - Stanford, Università di Trento, King Abdulaziz City for Science and Technology, University of Florida
IAA-CU-13-12-02
Lotus Flower: solar panels deployable system - G. Martinotti - GAUSS Srl
IAA-CU-13-12-03
Design and Manufacturing Process of Aalto-1 Solar Panels - J. Finnholm, J. Hemmo, J. Praks - Aalto University
IAA-CU-13-12-04
Identifying areas of dust storms using image segmentation methods and development optical camera simulator for CubeSat - S. Kanazawa, L. Ridolfi, P. Teofilatto - JAXA, Sapienza Università di Roma
IAA-CU-13-12-05
A compact, lightweight laser retroreflector payload optimized for CubeSats - Simone Dell'Agnello – INFN
IAA-CU-13-12-06
CubeSat Dynamics and Collision Risk Evaluation- M. Pontani, C. Cappelletti, F. Graziani- GAUSS Srl

IAA-CU-13-12-07
PPTCUP: performances and extended test results - S. Ciaralli, M. Coletti, F. Guarducci, S. B. Gabriel - University of Southampton
IAA-CU-13-12-08
Method for a simplified cubesat design approach- M. Sehringer, F. Schäfer, M. Schimmerohn - Fraunhofer Institute for High-Speed Dynamics
IAA-CU-13-12-09
Cubesats - From University to More Reliable Satellites and Missions - O. C. Durão, N. Schuch - National Institute for Space Research, INPE
IAA-CU-13-12-10
Aalto-1 Spectral Imager: Towards detailed design- A. Näsilä, K. Viherkanto, H. Saari, J. Antila, R. Mannila, C. Holmlund, J. Mäkynen, I. Näkki, U. Kantojärvi, T. Antila, H. Toivanen - Aalto University

16.30 – 16.45 Coffee Break

16.45 – 18.30 ***Technical Session XIII:*** ***CubeSat Subsystems - Communications***
Chairman: Piero GALEONE, European Space Agency

IAA-CU-13-13-01
Authenticated uplink for the small, low-orbit student satellite NUTS - B. Bezem, P. K. J. Fjellby, R. Birkeland, S. Mjlsnes - Norwegian University of Science and Technology
IAA-CU-13-13-03
Application of Slow Wave Structures for Miniaturized Satellite Feeding Networks- J. Abraham, R. Birkeland, T. Mathiesen - Norwegian University of Science and Technology
IAA-CU-13-13-04
Design of high data rate, low power and efficient S-band transmitter for Aalto-1 nanosatellite mission - Jussila, J.; Holopainen, J.; Ben Cheikh, S.; Praks, J.; Kestilä, A.; Hallikainen, M. - Aalto University
IAA-CU-13-13-05
Design of an antenna system for CubeSat satellites - E. Pittella, S. Pisa, A. Nascetti - Sapienza University of Rome
IAA-CU-13-13-06
Newly developed 145MHz and 435MHz band super small antenna without deployment mechanism for CubeSat , Y. Saito, H. Watari, H. Okada, T. Kameda - University of Tsukuba, AIST
IAA-CU-13-13-07
Brief Guideline to CubeSat Antennas - A. E. Ahmed, M. E. Babiker - University of Khartoum
IAA-CU-13-13-08
VHF transmitter for CubeSat - N. Abdelhamid, A. Abdelkarim - University of Khartoum

Poster Session

- IAA-CU-13-0P-01

Wren: proof of concept of the development of a Femto Satellite – Sacha J. Tholl; Paul Kocyla; Bastian Döen; Matthias Stahnke - StaDoKo UG (haftungsbeschränkt), Aachen, Germany

- IAA-CU-13-0P-02

Call for Experiments for an Extendable Boom aboard a Nanosatellite- M. F. Barschke, F. Baumann, W. Ballheimer, K. Großekatthöfer, K. Brieß - Technische Universität Berlin

- IAA-CU-13-0P-03

Electric Power Supply Of Nanosatellite «PolyTAN -1 » - K. Evhen, A. Budenniy, B. Rassamakin - Kyiv Polytechnic Institute

- IAA-CU-13-0P-04

Application of honeycomb panels for thermal management of nanosatellites- A. Zakovorotny , A. Rassamakin, S. Khairnasov , B. Rassamakin - Kyiv Polytechnic Institute

Friday 8th February 2013

10.00-12.45 ***Half a day with High School Students***

Robert J. Twiggs, Benjamin K. Malphrus, Jordi Puig-Suari, Jennifer B. Carter , Chantal Cappelletti meet the High School Students for laboratory applications

Saturday 9th February 2013

Visit Roma: a guided tour with Prof. Elena Santini