

BOOK OF ABSTRACTS

Part I – Saturday Dec 6

Space Elevator System



2 nd European SE Conference		Luxembourg Dec 6 -7, 2008
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Sat Dec 6, 2008: Space Elevator System

9.00-9.15	Welcome address, overview and leitmotif of the conference	Mr. Markus Klettner, EuroSpaceward (ESW)
9.15-10:00	How the exploration of space will provide new resources and skills for the protection of the Earth's environment	Prof. Charles Cockell, Open University Milton Keynes
10.00-10.30	Space Elevator part I: Introduction	Dr. Brad Edwards, ESW
10.30-11.00	Coffee break	
11.00-11.30	Space Elevator part II: State-of-the-art	Dr. Brad Edwards, EuroSpaceward
11.30-12:00	Impact analysis of the space elevator on space activities	Mr. Andreas Hein, WARR, TUM
12.00-12.30	Overview on Space Elevator related endeavours in Europe	Mr. Markus Klettner, Mr. Jose Casas, UPC
12.30-14.00	Lunch	
14.00-14.30	1% into space: update on the NASA power beaming challenge	Dr. Bryan Laubscher, Odysseus Industries, USA
14:30-15.00	Power beaming – State-of-the-art	Mr. Benoit Michel, UCL
15.00-15.30	Space capability testing of SE climbers	Dr. Pierre Rochus, CSL
15.30-16.00	Coffee break	
16.00-16.30	Design of Japan's E-T-C Space Elevator Climber	Dir. Akira Tsuchida, JAXA, JSEA
16.30-17.00	Climber design for manned travel to space	Dr. Brad Edwards, ESW
17.00-18.00	<i>The Interplanetary Cable / Line-s and Ribbon-s: Artist speech & poster session</i> <i>Imagine Travelling By Space Elevator: Award ceremony on the children's drawing contest.</i>	Mrs. Lucia Prandi, Visual/Conceptual Artist, Modena, Italy Mrs. Montserrat Ugalde, EuroSpaceward

9:15 – 10:00 Prof. Charles Cockell (Open University): ***How the exploration of space will provide new resources and skills for the protection of the Earth's environment***



Prof. Charles Cockell, Open University, UK, is currently Chair of Microbiology at the Open University in Milton Keynes and Chair of the Earth and Space Foundation. Following his doctorate at the University of Oxford, Prof. Cockell has worked for NASA and the British Antarctic Survey.

Prof. Cockell is also Sir Arthur Clarke Award laureate and author of the best-selling science book "Space on Earth: Saving Our World by Seeking Others". His talk will reflect EuroSpaceward's vision and its leitmotif: Preserving and improving life on Earth by going into Space

Abstract: Environmentalism and space exploration have often been viewed as an either-or option for human development. Not only are they complementary, however, but they positively assist each other in development. So intertwined are the successful settlement of the Earth and space that it is possible to simply dispense with this separation and to view space and Earth settlement as a continuum of activity that seeks to enhance the survival of life. This view has profound implications for the practical approaches by which the two challenges are addressed. Drawing upon numerous examples from science, technology and ethics, I will illustrate this argument.

Reference: C.S. Cockell 2006. Space on Earth: Saving Our World by Seeking Others. Macmillan.

Notes /questions:

10.00 – 11.30 Dr. Bradley Edwards (EuroSpaceward): **Space Elevator part I and part II - *Introduction and state-of the-art***



Dr. Brad Edwards received his Ph.D. in Physics from the University of Wisconsin at Madison, USA, then spent ten years at Los Alamos National Laboratory developing space missions and advanced technology. His work at Los Alamos included building the world's first functional optical cryo-cooler, leading roles on several space missions, and developing advanced technology such as superconducting tunnel junctions.

However, Dr. Edwards is best known for his work developing the first viable designs for a space elevator. He is considered the father of the modern space elevator and is leading the effort to develop and build a space elevator. He is President of EuroSpaceward and Arthur C. Clark Award laureate.

Abstract: The space elevator often goes against common perceptions and intuition - it is an innovation. Construction of the elevator has now been discussed for roughly 10 years and considerable progress has been made in both technical and non-technical areas. The advance has been such that the current primary hurdles are financial and political. With these two hurdles addressed the technical work can be completed and the first space elevator can be built. These two presentations will go through the basics of the space elevator and what it is and then discuss the state of the art for construction of the system.

Notes /questions:

11.30-12.00 Mr. Andreas Hein (Technical University Munich):
Impact analysis of the Space Elevator on space activities



Andreas Hein is a graduate aerospace engineering student of the Technical University of Munich (TUM) and founder and former project manager of the WARR (Scientific Workgroup for Rocketry and Astronautics) Space Elevator Team at TUM, which is working on various aspects of the space elevator system.

Abstract: This paper analyses the impact of a hypothetical space elevator on different areas of space activities.

The space elevator promises to drastically reduce space transportation costs and greatly facilitate the access to space and is often proposed as a mean to vastly increase the scope and amount of space activities. In order to investigate this claim, first, the cost structure of current space missions is analysed and the impact of an idealized space elevator evaluated, in order to explore the whole range of possible benefits. The idealized elevator is capable of delivering any spacecraft mass and volume into space, its usage is for free and it is 100% reliable. The maximum potential for space mission cost reduction is estimated. Second, current and proposed future space missions are analysed with respect to the existence of an "ideal" space elevator. For current activities, probable benefits are assessed and for future activities, the change in potential feasibility estimated.

Notes /questions:

12.00-12.30 Mr. Markus Klettner (EuroSpaceward): **Overview on Space Elevator related endeavours in Europe**



Mr. Markus Klettner is Executive Director of EuroSpaceward. He received a MSc. degree in Space Management from the International Space University. In addition he owns a university degree in engineering and post-graduated in International Business Management. His MBA thesis in 1990 analysed the emerging commercial space market in Europe. During several years he edited the quarterly astronomical journal S.P.A.C.E at the House of Nature in Salzburg.

Abstract: Europe is currently among the leaders in the worldwide efforts to produce super strong CNT threads that could be used in a space elevator tether. Laboratories in UK, France and Germany lead the path as we will witness exemplary in the stream on CNT fibres & tether design later on in this conference.

In addition we may see next year, or by 2010, the first functional microwave powered space elevator car developed at the Technical University of Munich running the 1km vertical track into the sky at the NASA Beam Power Challenge.

The lecture gives an overview about the past and current Space Elevator related activities as facilitated and coordinated by EuroSpaceward.

Notes /questions:

14:00 – 14:30 Dr. Bryan Laubscher (Odysseus Industries): **1% into space: update on the Spaceward/ NASA power beaming competition**



Dr. Bryan Laubscher is Astrophysicist. He was a project leader at Los Alamos National Laboratory until 2008. Over the last 20 years he has carried out research and development in astrophysics, electromagnetic detection physics, space instrumentation, spacecraft, non-linear optics, laser technology, lidar and spectrometer development. He is now with Odysseus Technologies focussing on the development of strong CNT threads.

Abstract: The first topic of this presentation is a look at the concept of prizes. Then a summary of the past power beaming competitions will be summarized. The focus of the summary will be the leading teams and the increasing technology fielded by them. In addition the insights into the challenges of the Space Elevator provided by past games will be discussed. Finally, predictions will be offered concerning the competition held in the first quarter of 2009.

Notes /questions:

14.30 – 15.00 Mr. Benoit Michel (ESW & Université Catholique de Louvain): **Power beaming – State-of-the-art**



Benoit Michel co-created one of the first 3D cartoon studios in Europe, "Neurones," in 1989. After 10 years of R&D in computer graphics he switched to research and project management in telecommunications, human-machine interaction, and digital cinema and space applications. Currently he serves at Université Catholique de Louvain in Belgium as the general manager of the SIMILAR network, a network of excellence in multimodal interface research and of EDCINE.

In addition Benoit teaches 'Extreme Engineering' at the HEMES-Gramme Engineering College in Liège. He also is head of the server group for the European Digital Cinema Forum and member of the board of the Multitel research centre as well as of the editorial board of ERCIM, the European host organization of the World Wide Web Consortium.

Abstract:

Wireless power transmission has been widely treated in recent years. A broad variety of applications has been investigated, from Earth to orbit, orbit to Earth, in-orbit and planetary ones, such as for Moon and Mars missions. The question of whether to use laser or microwave technology has been widely discussed but is not completely answered.

The paper presents various approaches and experiments conducted in the past. It highlights the current state of laser power beaming intended to be applied at the next NASA beam power contest and concludes with a comparison of the 2 basic methods - laser and microwave

Notes /questions:

15.00 – 15.30 Dr. Pierre Rochus (Space Center Liège): **Space capability testing of climbers**



Dr. Pierre Rochus is Deputy General Manager (R&D) at Centre Spatial de Liège. He is an expert in optical metrology, new space technologies and space environment testing. Dr. Rochus teaches also design of space instruments and celestial mechanics at the University of Liège.

Abstract: The Space Center Liège (CSL) is a research centre of the University of Liège that has expertise in Space Science instrumentation and in optical metrology for space optics and structures (in particular expandable space structures). CSL is also an ESA coordinated test facility, specialized in optical tests of instrumentation in a space environment.

After a short presentation of CSL, this lecture will cover the following topics: possible space applications of CNT and possible space qualification tests to be performed on Space Elevator climbers.

Notes /questions:

16.00 – 16: 30 Akira Tsuchida, (JAXA /JSEA /E-T-C-): ***Design of Japan's E-T-C Space Elevator Climber***



Dir. Akira Tsuchida is JAXA Flight Director at Tsukuba Space Center of the Japanese experiment module 'Kibo' (Hope) of the International Space Station ISS and Member of the Board of the Japan Space Elevator Association. He led the first Japanese climber team E-T-C during the NASA beam power challenge in Salt Lake City in 2007.

Abstract: Mr. Akira Tsuchida, President of Earth-Track Corporation, will introduce the concept of the Japanese space train first. Then he is going to discuss E-T-C's climber design for a real Space Elevator prototype. After that, the design of the very first Japanese climber mock-up, the so-called E-T-C Climber will be explained. It has been the entry of the Japanese E-T-C team to NASA's Power Beaming competition in year 2007. Finally Dir. Tsuchida will point out the functional requirements to develop a real Space Elevator and will depict the preliminary road map to develop each component.

Notes /questions:

16.30-17.00 Dr. Brad Edwards (EuroSpaceward): ***Climber design for manned travel to space***



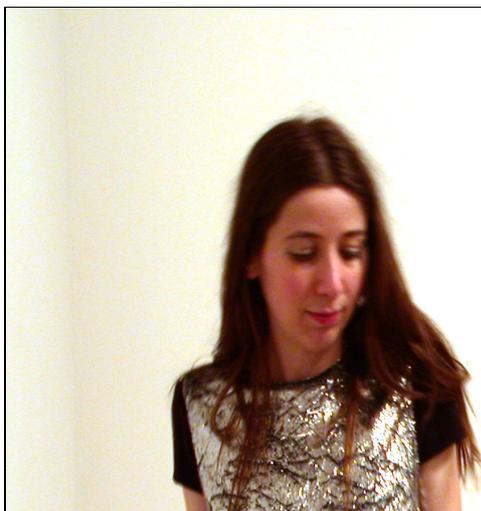
Dr. Brad Edwards received his Ph.D. in Physics from the University of Wisconsin at Madison, USA, then spent ten years at Los Alamos National Laboratory developing space missions and advanced technology. His work at Los Alamos included building the world's first functional optical cryo-cooler, leading roles on several space missions, and developing advanced technology such as superconducting tunnel junctions.

However, Dr. Edwards is best known for his work developing the first viable designs for a space elevator. He is considered the father of the modern space elevator and is leading the effort to develop and build a space elevator. He is President of EuroSpaceward and Arthur C. Clark Award laureate.

Abstract:

The space elevator provides unprecedented access to space but it is not ideal. The space elevator can readily carry large amounts of cargo to any orbit. For humans to ride the elevator to space many aspects must be considered. The initial ascent to several hundred kilometers altitude would be simple for space elevator. Humans would need to be protected from the vacuum and temperatures of space in the same way as currently done on the space station. For transporting humans to geosynchronous altitude or beyond the slow speed of a climber's ascent exposes human's to radiation. This is a hazard not seen by astronauts in low-Earth orbit. Special planning must be taken to allow humans to get through Earth's radiation belts safely. Beyond geosynchronous, the space elevator can readily transport humans to the moon, Mars or other destinations with high speed and substantial resources to survive the rigors of space. This presentation will examine the different scenarios, opportunities and limits of using the space elevator for transporting humans into space.

17.00-17.30 Mrs. Lucia Prandi (Visual/Conceptual Artist, Modena, Italy): ***The Interplanetary Cable / Line-s and Ribbon-s***, Artist speech & poster session



Lucia Prandi is a Visual /conceptual artist. Her programme *ICK / Isolating Connecting Knowledge* investigates the idea of limit and the extreme frontiers of knowledge in a system of projects.

It includes the intersection Art, Science, Technology, other disciplines and the idea of utopia.

In this context the Space Elevator and CNTs are part of some works, presented in different art venues since 2002, featuring Brad Edwards' collaboration or participation in interviews, among which the interview on the opening days of the 50th Venice Biennale.

Lucia Prandi has participated in the international art exhibition the 50th Venice Biennale/Visual Arts - 2003, directed by Francesco Bonami, *Utopia Station*, curated by Hans Ulrich Obrist, Molly Nesbit, and Rirkrit Tiravanija and in the London Architecture Biennale - 2006.

Abstract:

Lucia Prandi will present the project *The Interplanetary Cable / Line-s and Ribbon-s*, consisting of an installation and a performance composed of written and voice conversations with Bradley Edwards and some other participants. The final result will be revealed in an art exhibition in the near future.

Ribbons of composite ideas bridging people, space and time, systems.

The ideas of complex systems, frames, connections, non-linear dynamics, fuzzy logic, unpredictable, serendipity are just some of the ideas at play.

The imaginary and the real, the possible and the impossible.

Travels and maps. Stairways and Stellar islands. Cosmic horizon.

Pencils and diamonds. Light and carbon will draw a line. A pathway to interstellar dust.

A *Poster Project* with fragments of *Conversation-s Ribbon-s 2007* will be presented at the conference poster session.

17.30-18.00 Mrs. Montse Ugalde Huebe (EuroSpaceward):
***Imagine travelling by Space Elevator – EuroSpaceward’s
1st children’s drawing contest***



Montse Ugalde Huebe is Mexican by origin, studied at the University of Texas PanAmerican where she received a Bachelor's degree in Industrial Engineering with specialization in Manufacturing. Montse has been already part of EuroSpaceward's team that managed successfully the 1st European Workshop on Space Elevator Climber and Tether Design in 2007. In addition she is organizing EuroSpaceward's Children Drawing Contest 2008.

Abstract:

The contest is intended for children attending school in Luxembourg from levels 1st to 9th grade to create awareness of the technological and scientific areas of space study, research and development. As well as to create conscience about the aspects of future life concentrated in space and the usage of renewable solar energy in order to achieve a sustainable ecology, economy and biosphere on our planet Earth.

Full imagination and artistic sensitivity will be portrayed in each of the children's drawings containing a message towards space elevators beyond borders and difference in their background, cultures and languages.

Notes /questions: