NIAC
NASA Institute for Advanced Concepts

NIAC FELLOWS MEETING

November 9, 1999

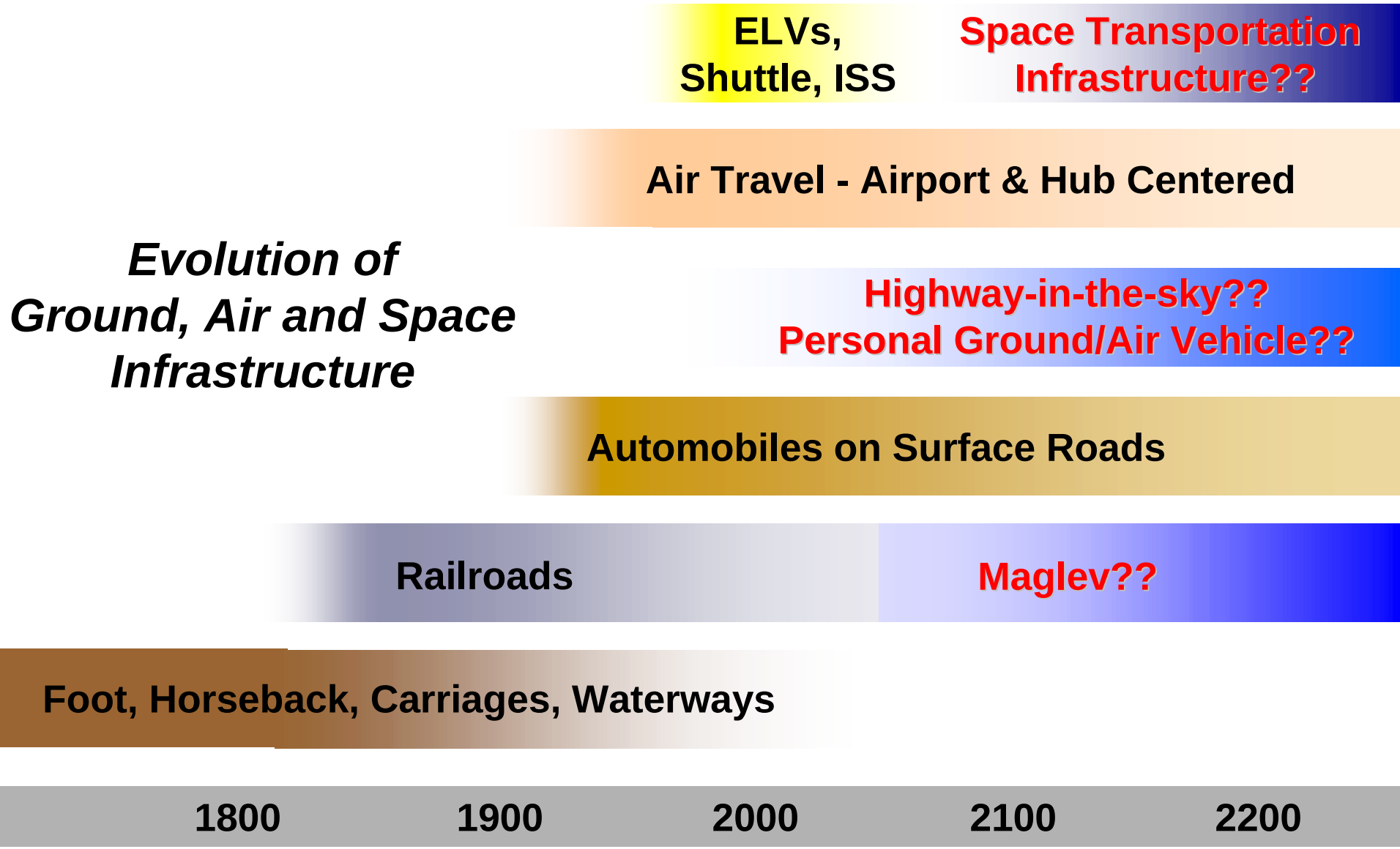
Dr. Robert A. Cassanova

Director

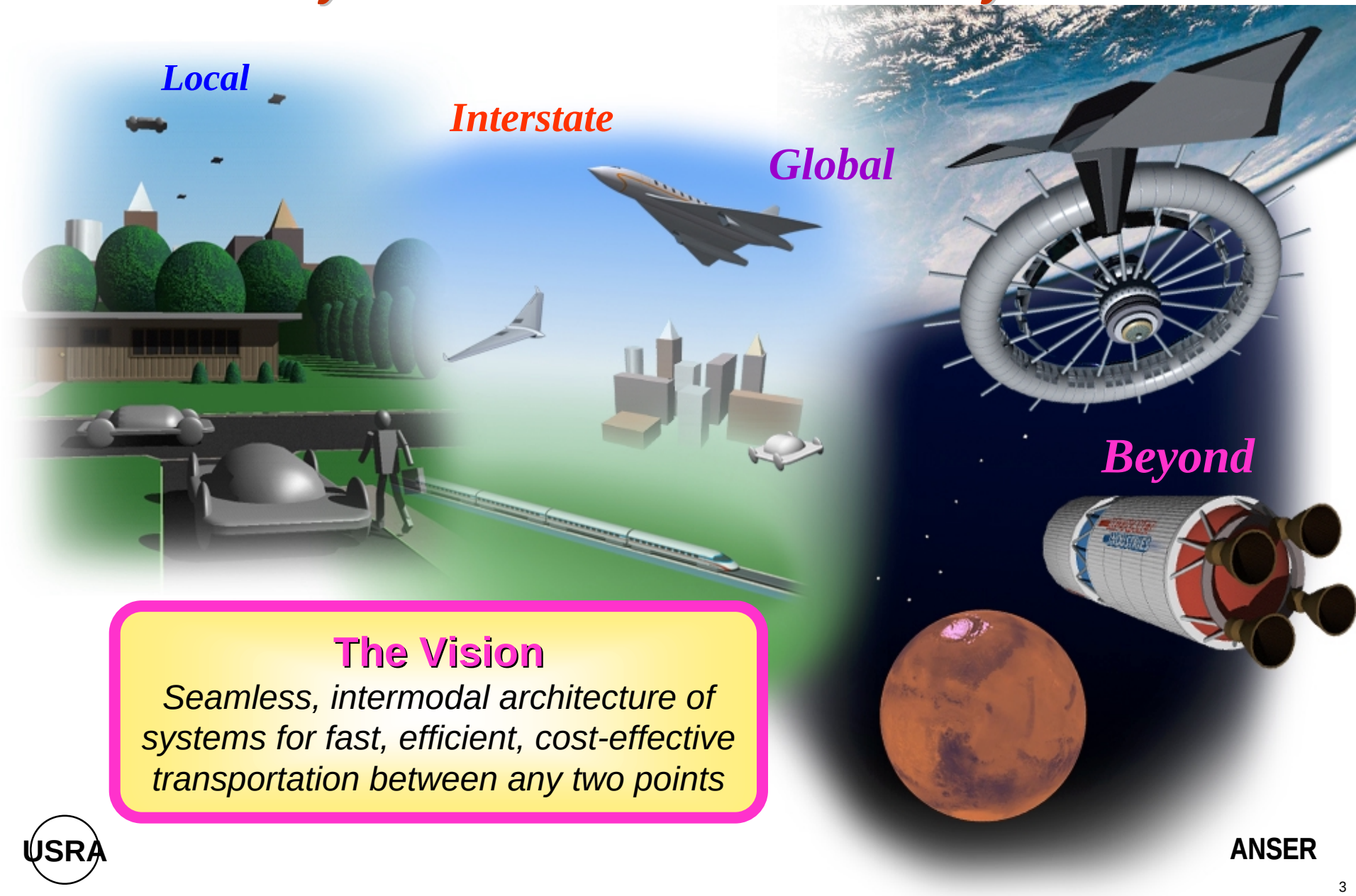
"Don't let your preoccupation with reality stifle your imagination" - Robert A. Cassanova

Ground-Air-Interplanetary Transportation Infrastructure

Evolution of Ground, Air and Space Infrastructure



From Doorstep to Destination: Anywhere in the World … and Beyond



The Vision

Seamless, intermodal architecture of systems for fast, efficient, cost-effective transportation between any two points

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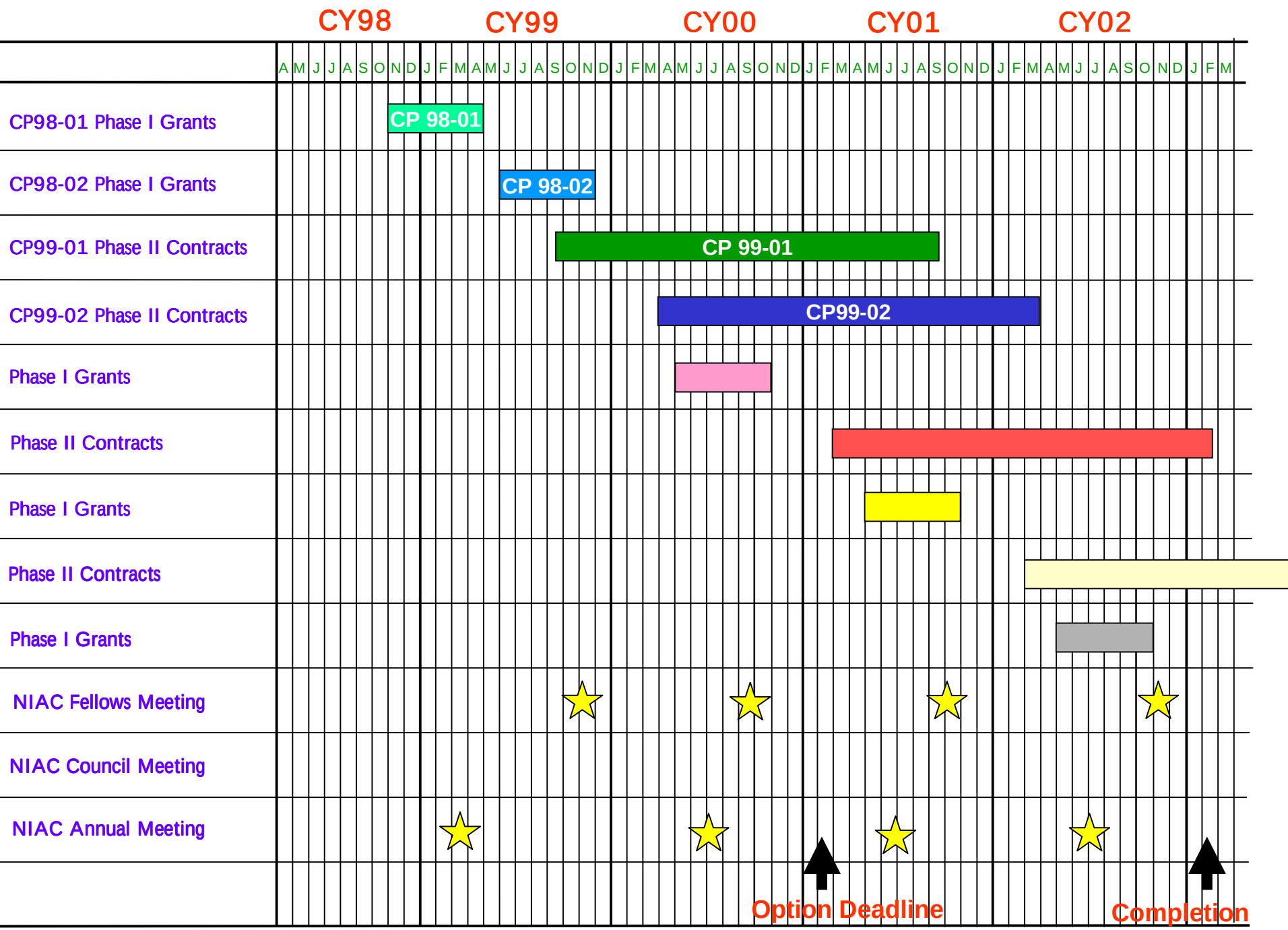
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CY99
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CY01
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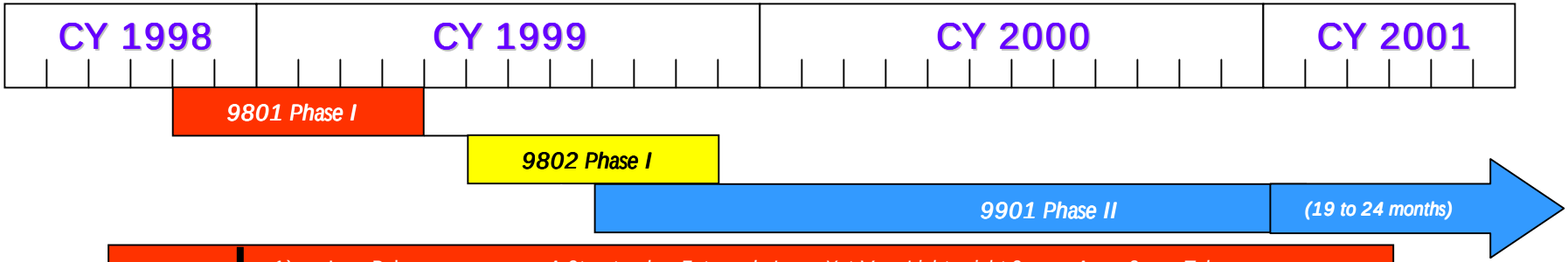
CP98-01 Phase I Grants
CP98-02 Phase I Grants
CP99-01 Phase II Contracts
CP99-02 Phase II Contracts
Phase I Grants
Phase II Contracts
Phase I Grants
Phase II Contracts
Phase I Grants
NIAC Fellows Meeting
NIAC Council Meeting
NIAC Annual Meeting
CP 98-01
CP 98-02
CP 99-01
CP99-02
Option Deadline
Completion



CP9801 AWARDEES *Phase I*

1)	Ivan Bekey	*A Structureless Extremely Large Yet Very Lightweight Swarm Array Space Telescope*
2)	Mark E. Campbell	*Intelligent Satellite Teams (ISTs) for Space Systems*
3)	Steven Dubowsky	*Self-Transforming Robotic Planetary Explorers*
4)	Robert E. Gold	*SHIELD: A Comprehensive Earth Protection System*
5)	Paul Gorenstein	*An Ultra-High Throughput X-Ray Astronomy Observatory With A New Mission Architecture*
6)	Clark W. Hawk	*Pulsed Plasma Power Generation*
7)	Steven D. Howe	*Enabling Exploration of Deep Space: High Density Storage of Antimatter*
8)	Robert P. Hoyt	*Cislunar Tether Transport System*
9)	Ron Jacobs	*A Biologically-Inspired MARS Walker*
10)	Ilan Kroo	*Mesicopter: A Meso-Scale Flight Vehicle for Atmospheric Sensing*
11)	Geoffrey A. Landis	*Advanced Solar- and Laser-Pushed Lightsail Concepts*
12)	Ralph L. McNutt, Jr.	*A Realistic Interstellar Explorer*
13)	Clint Seward	*Low-Cost Space Transportation Using Electron Spiral Toroid (EST) Propulsion*
14)	Charles M. Stancil	*Electric Toroid Rotor Technology Development*
15)	Robert M. Winglee	*Mini-Magnetospheric Plasma Propulsion*
16)	Neville J. Woolf	*Very Large Optics for the Study of Extrasolar Terrestrial Planets*

CP9802 AWARDEES *Phase I*

1)	Thomas J. Bogar	*Hypersonic Airplane Space Tether Orbital Launch System*
2)	Webster Cash	*X-Ray Interferometry: Ultimate Astronomical Imaging*
3)	Dean Spieth	*Ultralight Solar Sails for Interstellar Travel*
4)	Shane Farritor	*A Modular Robotic System to Support the Surface Operations of Human Mars Exploration*
5)	Carl Grant	*An Advanced Counter-Rotating Disk Wing Aircraft Concept*
6)	Timothy Howard	*Planetary-Scale Astronomical Bench*
7)	Terry Kammash	*Antiproton-Driven, Magnetically-Insulated Inertial Fusion (MICF) Propulsion System*
8)	Laurence E. LaForge	*Architectures and Algorithms for Self-Healing Autonomous Spacecraft*
9)	Michael LaPointe	*Primary Propulsion for Piloted Deep Space Exploration*
10)	Kerry T. Nock	*Global Constellation of Stratospheric Scientific Platforms*
11)	Eric E. Rice	*Development of Lunar Ice Recovery System Architecture*
12)	Eric E. Rice	*Advanced System Concept for Total ISRU Based Propulsion & Power Systems for Unmanned and Manned Mars Exploration*
13)	John Slough	*Rapid Manned Mars Mission With A Propagating Magnetic Wave Plasma Accelerator*
14)	Robert Zubrin	*The Magnetic Sail*

CP9901 AWARDEES *Phase II*

1)	Robert M. Winglee	*Mini-Magnetospheric Plasma Propulsion*
2)	Ilan Kroo	*Meso-Scale Flight Vehicle for Atmospheric Sensing*
3)	Steven Dubowsky	*Self-Transforming Robotic Planetary Explorers*
4)	Robert P. Hoyt	*Moon and Mars Orbiting Spinning Tether Transport (MMOSTT) Architecture*
5)	Neville J. Woolf	*Very Large Optics for the Study of Extrasolar Planets*
6)	Paul Gorenstein	*An Ultra High Throughput X-Ray Astronomy Observatory With A New Mission Architecture*

CP9801 Awards

Phase II	PI Name & Organization	Advanced Concept Proposal Title	NASA Enterprise			
			AST	HEDS	SS	ES
	Bekey, Ivan *Bekey Designs, Inc.*	A Structureless Extremely Large Yet Very Lightweight Swarm Array Space Telescope			Primary	
	Campbell, Mark E. *University of Washington*	Intelligent Satellite Teams (ISTs) for Space Systems			Primary	Secondary
	Dubowsky, Steven *MIT*	Self-Transforming Robotic Planetary Explorers		Primary	Secondary	
	Gold, Robert E. *Johns Hopkins University*	SHIELD: A Comprehensive Earth Protection System			Primary	
	Gorenstein, Paul *Smithsonian Institute*	An Ultra-High Throughput X-Ray Astronomy Observatory With A New Mission Architecture			Primary	
	Hawk, Clark W. *University of Alabama-Huntsville*	Pulsed Plasma Power Generation	Primary	Secondary		
	Howe, Steven D. *Synergistics Technologies, Inc.*	Enabling Exploration of Deep Space: High Density Storage of Antimatter	Primary	Secondary		
	Hoyt, Robert P. *Tethers Unlimited*	Cislunar Tether Transport System	Primary	Secondary	Secondary	
	Jacobs, Ron *Intelligent Inference Systems Corp.*	A Biologically-Inspired MARS Walker		Primary	Secondary	
	Kroo, Ilan *Stanford University*	Mesicopter: A Meso-Scale Flight Vehicle for Atmospheric Sensing	Primary		Secondary	Secondary
	Landis, Geoffrey A. *Ohio Aerospace Institute*	Advanced Solar- and Laser-Pushed Lightsail Concepts	Primary		Primary	
	McNutt, Jr., Ralph L. *Johns Hopkins University*	A Realistic Interstellar Explorer			Primary	
	Seward, Clint *Electron Power Systems, Inc.*	Low Cost Space Transportation Using Electron Spiral Toroid (EST) Propulsion	Primary	Secondary		
	Stancil, Charles M. *Georgia Tech Research Institute*	Electric Toroid Rotor Technology Development	Primary			Primary
	Winglee, Robert M. *University of Washington*	Mini-Magnetospheric Plasma Propulsion	Primary		Primary	
	Woolf, Neville J. *University of Arizona*	Very Large Optics for the Study of Extrasolar Terrestrial Planets			Primary	Secondary

Primary
Secondary

CP9802 Awards

PI Name & Organization	Advanced Concept Proposal Title	NASA Enterprise			
		AST	HEDS	SS	ES
Bogar, Thomas J. *McDonnell Douglas Corporation*	Hypersonic Airplane Space Tether Orbital Launch System	Primary	Secondary		
Cash, Webster *University of Colorado*	X-Ray Interferometry: Ultimate Astronomical Imaging			Primary	
Farritor, Shane *University of Nebraska-Lincoln*	A Modular Robotic System to Support the Surface Operations of Human Mars Exploration		Primary	Secondary	
Grant, Carl *Diversitech Inc.*	An Advanced Counter-Rotating Disk Wing Aircraft Concept	Primary			
Howard, Timothy *SVS Systems Inc.*	Planetary-Scale Astronomical Bench			Primary	
Kammash, Terry *University of Michigan*	Antiproton-Driven, Magnetically Insulated Inertial Fusion (MICF) Propulsion System	Primary	Secondary		
LaForge, Laurence E. *The Right Stuff of Tahoe, Inc.*	Architectures & Algorithms for Self-Healing Autonomous Spacecraft	Primary	Primary	Primary	Primary
LaPointe, Michael *Horizon Tech. Development Group*	Primary Propulsion for Piloted Deep Space Exploration	Primary	Secondary		
Nock, Kerry T. *Global Aerospace Corporation*	Global Constellation of Stratospheric Scientific Platforms				Primary
Rice, Eric E. *Orbital Technologies Corporation*	Development of Lunar Ice Recovery System Architecture		Primary		
Rice, Eric E. *Orbital Technologies Corporation*	Advanced System Concept for Total ISRU Based Propulsion and Power Systems for Unmanned and Manned Mars Exploration	Primary	Secondary	Secondary	
Slough, John *MSNW*	Rapid Manned Mars Mission With A Propagating Magnetic Wave Plasma Accelerator	Primary		Secondary	
Spieth, Dean *Pioneer Astronautics*	Ultralight Solar Sails for Interstellar Travel	Primary		Primary	
Zubrin, Robert *Pioneer Astronautics*	The Magnetic Sail	Primary		Primary	

Primary
Secondary

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Definitions: Phase I and II

PHASE I
6 months
$50 - 75K

① Is the concept revolutionary rather than evolutionary? To what extent does the proposed activity suggest and explore creative and original concepts?

② Is the concept for an architecture or system, and have the benefits been qualified in the context of a future NASA mission?

③ Is the concept substantiated with a description of applicable scientific and technical disciplines necessary for development?

PHASE II
up to 24 months
up to $500K

① Does the proposal continue the development of a revolutionary architecture or system in the context of a future NASA mission? Is the proposed work likely to provide a sound basis for NASA to consider the concept for a future mission or program?

② Is the concept substantiated with a description of applicable scientific and technical disciplines necessary for development?

③ Have enabling technologies been identified, and has a pathway for development of a technology roadmap been adequately described?

④ Has the pathway for development of a cost of the concept been adequately described and are costing assumptions realistic? Have potential performance and cost benefits been quantified?

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Advanced Concepts for the 21st Century

YEAR

2000 2010 2020 2030 2040 2050

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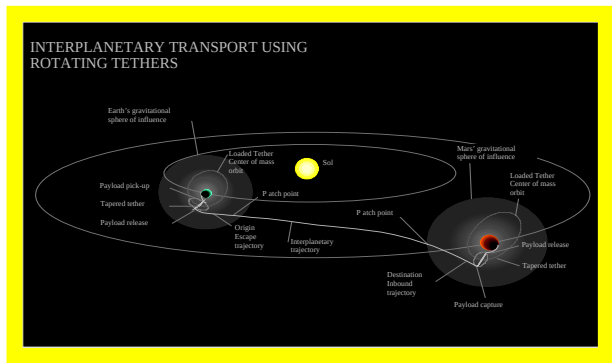
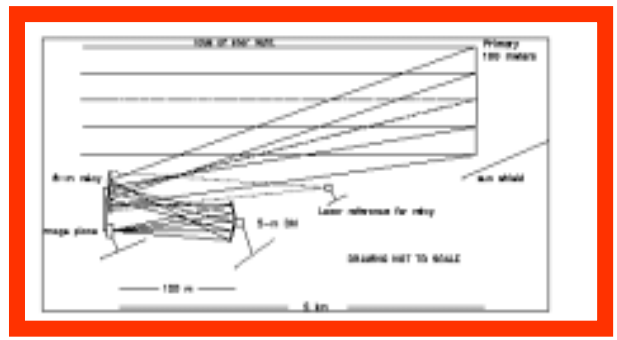
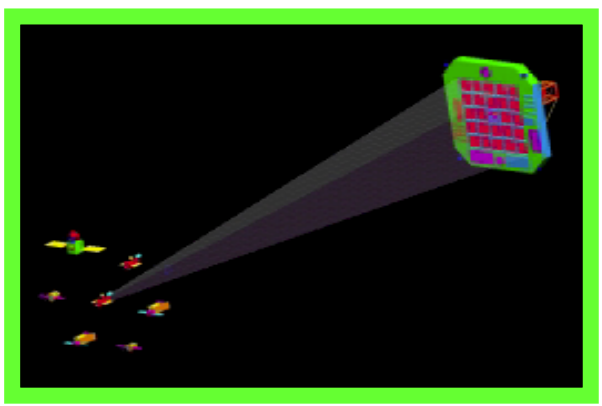
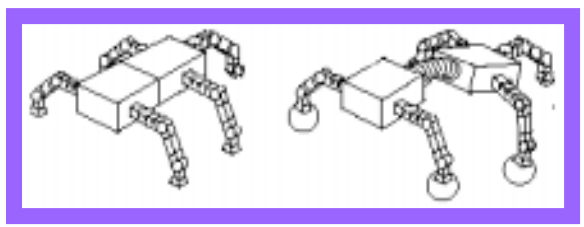
NASA Institute for Advanced Concepts

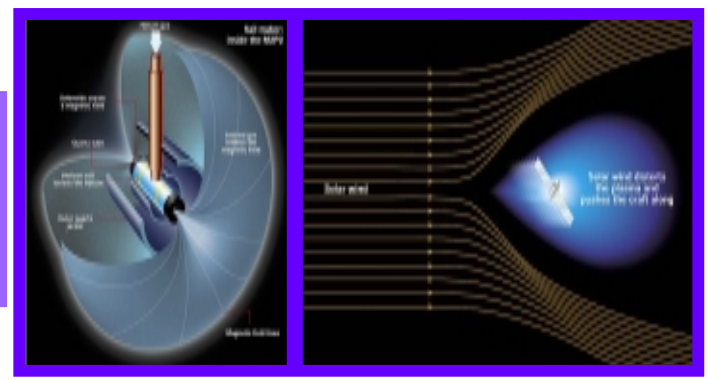
Advanced Concepts











NIAC Grant Status Reports - 8:45am - 10:15am

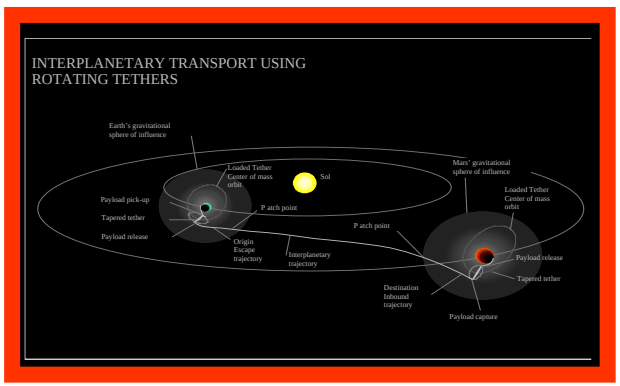
Thomas J. Bogar
McDonnell Douglas Corporation
"Hypersonic Airplane Space Tether Orbital Launch System"

Carl Grant
Diversitech, Inc.
"An Advanced Counter-Rotating Disk Wing Aircraft Concept"

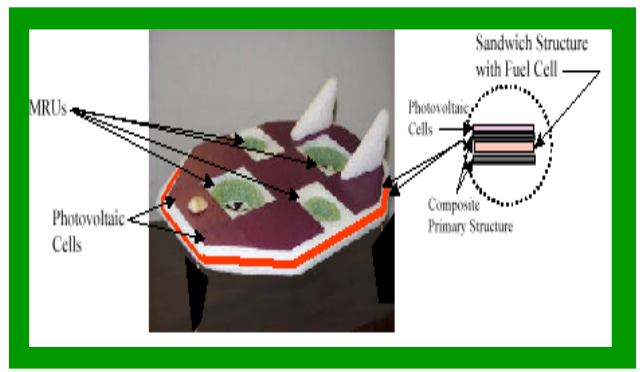
Kerry T. Nock
Global Aerospace Corporation
"Global Constellation of Stratospheric Scientific Platforms"

Related NIAC Grants and Contracts

Ilan Kroo
Stanford University
"Meso-Scale Flight Vehicle for Atmospheric Sensing"
Phase II



Robert P. Hoyt
Tethers Unlimited, Inc.
"Moon and Mars Orbiting Spinning Tether Transport (MMOSTT) Architecture"
Phase II



Charles M. Stancil
Georgia Tech Research Institute
"Electric Toroid Rotor Technology Development"
Phase I

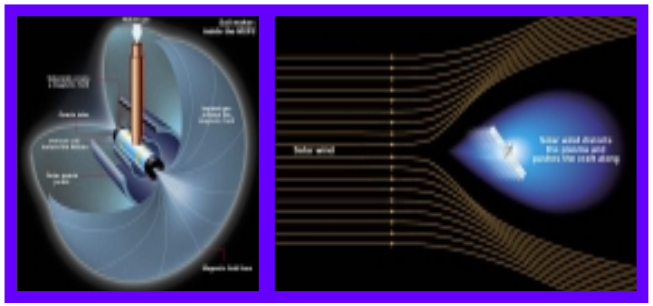
NIAC Grant Status Reports - 10:30am - 12:00pm

Terry Kammash
University of Michigan
"Antiproton-Driven, Magnetically-Insulated Inertial Fusion Propulsion System"

Michael LaPointe
Horizon Technologies Development Group
"Primary Propulsion for Piloted Deep Space Exploration"

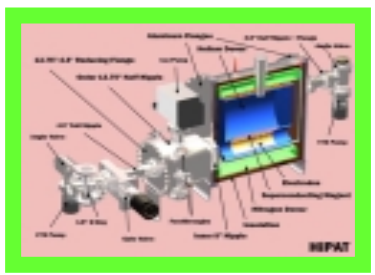
John Slough
MSNW
"Rapid Manned Mars Mission With A Propagating Magnetic Wave Plasma Accelerator"

Related NIAC Grants and Contracts



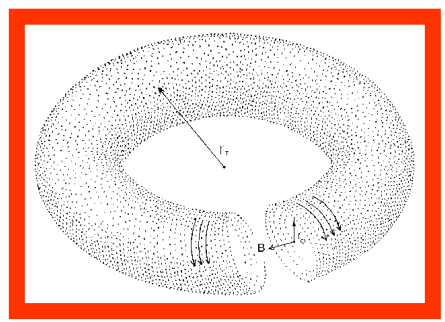
Robert M. Winglee
University of Washington
"Mini-Magnetospheric Plasma Propulsion"
Phase II

Clark W. Hawk
University of Alabama-Huntsville
"Pulsed Plasma Power Generation"
Phase I



Steven D. Howe
Synergistics Technologies, Inc.
"Enabling Exploration of Deep Space: High Density Storage of Antimatter"
Phase I

Clint Seward
Electron Power Systems, Inc.
"Low-Cost Space Transportation Using
Electron Spiral Toroid (EST) Propulsion"
Phase I



NIAC Grant Status Reports - 1:00pm - 3:00pm

Robert Zubrin
Pioneer Astronautics
"The Magnetic Sail"

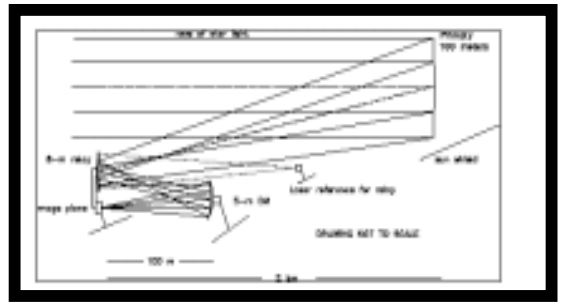
Dean Spieth
Pioneer Astronautics
"Ultralight Solar Sails for Interstellar Travel"

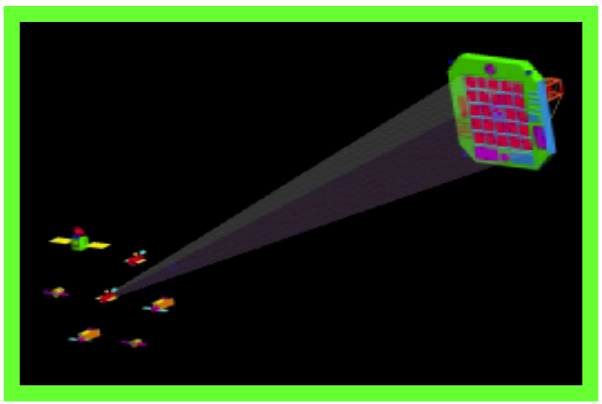
Webster Cash
University of Colorado
"X-Ray Interferometry: Ultimate Astronomical Imaging"

Timothy Howard
SVS Systems, Inc.
"Planetary-Scale Astronomical Bench"

Related NIAC Grants and Contracts

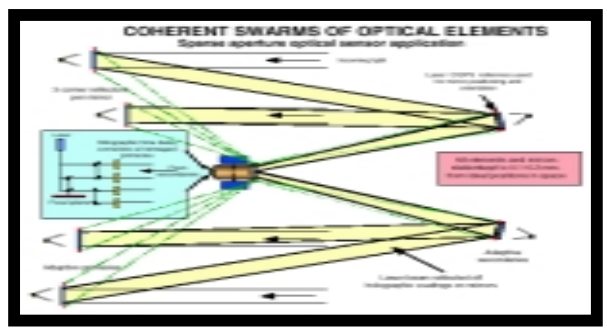
Neville J. Woolf
University of Arizona
"Very Large Optics for the Study of Extrasolar Terrestrial Planets"
Phase II



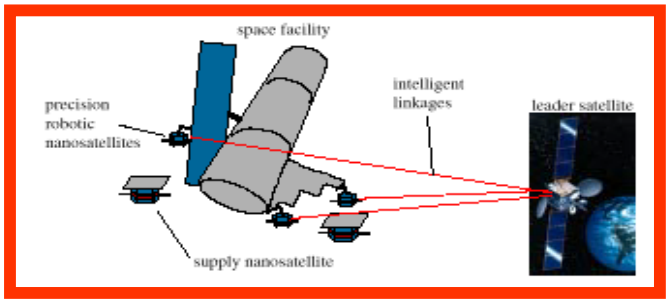


Paul Gorenstein
Smithsonian Institute
"An Ultra-High Throughput X-Ray Astronomy Observatory With A New Mission Architecture"
Phase II

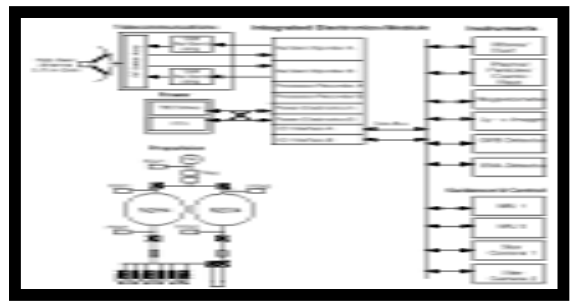
Ivan Bekey
Bekey Designs, Inc.
"A Structureless Extremely Large Yet Very Lightweight Swarm Array Space Telescope"
Phase I



Related NIAC Grants and Contracts



Mark E. Campbell
University of Washington
"Intelligent Satellite Teams (ISTs) for Space Systems"
Phase I



Ralph L. McNutt, Jr.
Johns Hopkins University
"A Realistic Interstellar Explorer"
Phase I

Robert E. Gold
Johns Hopkins University
"SHIELD: A Comprehensive Earth Protection System"
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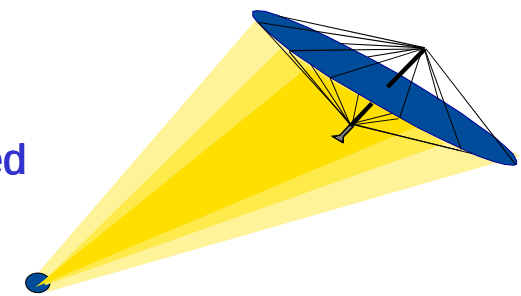
Geoffrey A. Landis
Ohio Aerospace Institute
"Advanced Solar- and Laser-Pushed Lightsail Concepts"
Phase I



NIAC Grant Status Reports - 3:15pm - 5:15pm

Laurence E. LaForge
The Right Stuff of Tahoe, Inc.
"Architectures & Algorithms for Self-Healing Autonomous Spacecraft"

Eric E. Rice
Orbital Technologies Corporation
"Development of Lunar Ice Recovery System Architecture"

Shane Farritor
University of Nebraska-Lincoln
"A Modular Robotic System to Support the Surface Operations of Human Mars Exploration"

Eric E. Rice
Orbital Technologies Corporation
"Advanced System Concept for Total ISRU Based Propulsion and Power Systems for Unmanned and Manned Mars Exploration"

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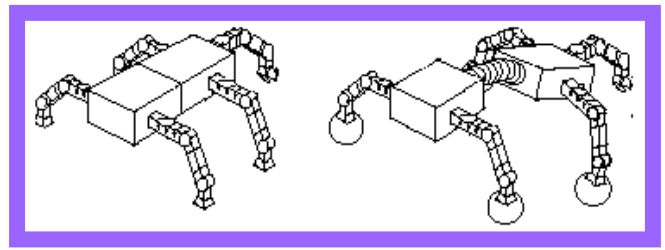
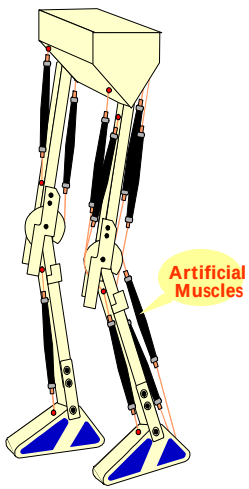
Massachusetts Institute of Technology
"Self-Transforming Robotic Planetary Explorers"
Phase II





Legged robot design using anatomical and physiological data from humans

Ron Jacobs
Intelligent Inference Systems Corporation
"A Biologically-Inspired MARS Walker"
Phase I