



SPACEPHARMA

Remote-Controlled Miniaturized Microgravity
Solutions

Yossi Yamin
Founder & CEO

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*“Every cubic inch of space
is a miracle.”*

— Walt Whitman

SPACEPHARMA in Milestones



2012

SpacePharma established



2015

Top world Game-Changers



2016

1# space company to watch

SPACEPHARMA in Milestones



2012

SpacePharma established

SpacePharma was established in 2012 by a unique multidisciplinary team of experienced space and science experts, former satellite developers, operators, engineers



2015

Top world Game-Changers

Announced as one of the top world list of 55 Game-Changers by CB Insights



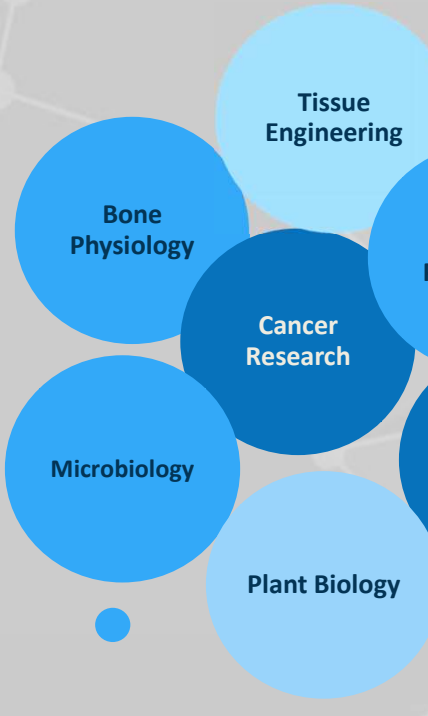
2016

1# space company to watch

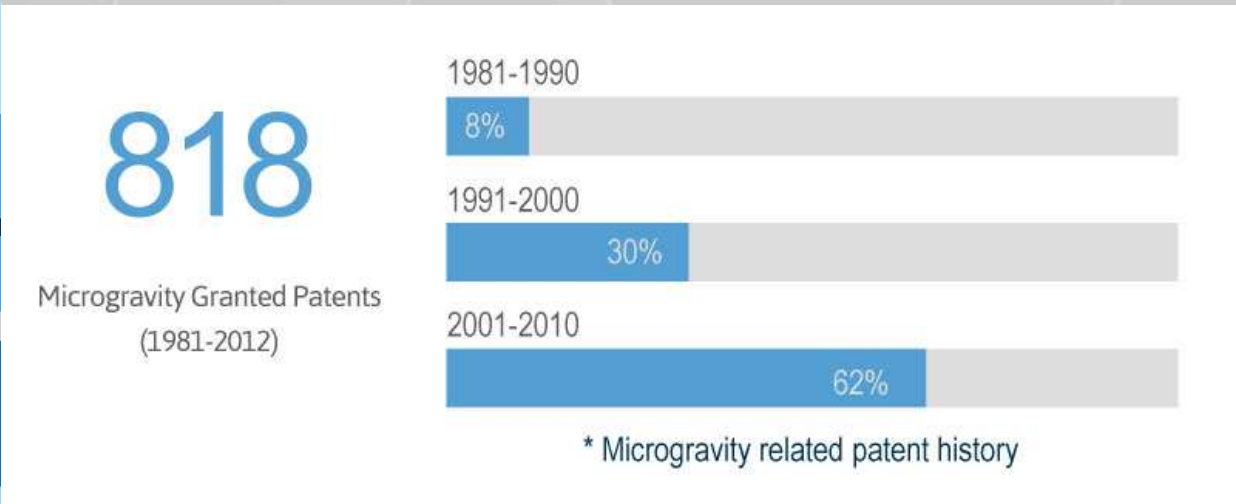
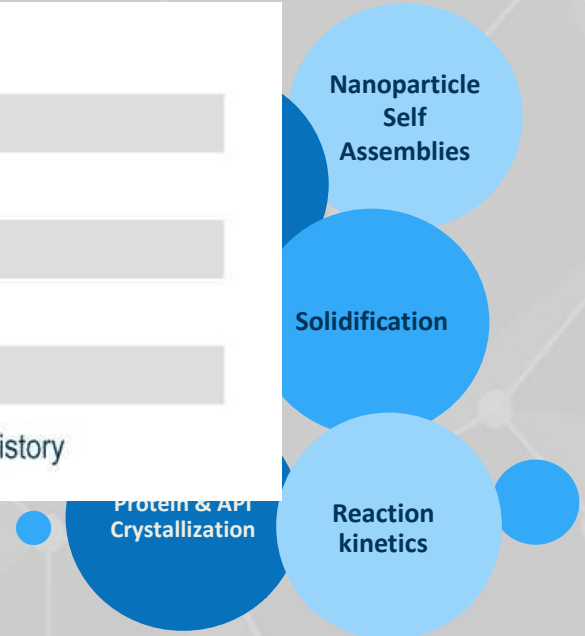
Selected by Geektime.com 1st among 10 space companies to watch in 2016 & 2017

Microgravity Research Fields

BioMed & BioTech



Pharma & Chemistry



Slide 5

IR1

Ifat Rotbein, 15/07/2014

Access to Microgravity Research today is limited to International Space Station (ISS)



BARRIER

Control over
experiment out of your
hands



BARRIER

Limited space agencies,
long wait times (years)



BARRIER

Very expensive



BARRIER

IP ownership
issues

Current issues - Space agenda today:



Current issues - Space agenda today

Background: Climate Change and Virus Outbreak



SPACE AND CLIMATE CHANGE

Climate change may have triggered Zika outbreak

Israeli and Swedish researchers find link between the virus pandemic and northeast Brazil's very hot, dry winter and spring.

By ISRAEL21c Staff | FEBRUARY 4, 2016, 12:29 PM



Climate change may have triggered Zika outbreak

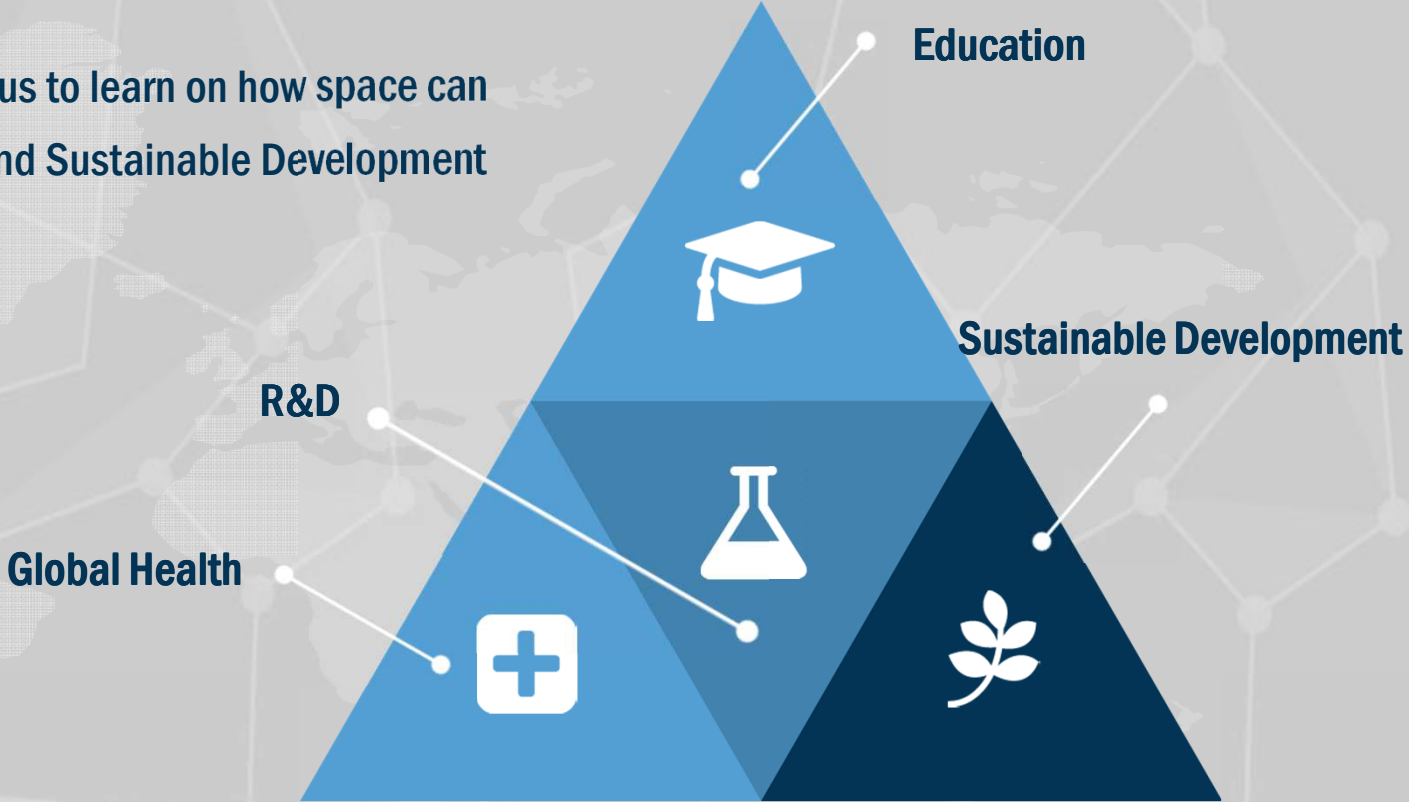
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SpacePharma's Contribution Areas

Enabling research in space will allow us to learn on how space can be used and improve Global Health and Sustainable Development



SpacePharma Contribution



Space and Sustainable Development

- Space Farming
- New Vaccines
- Improved Shelf life of colloidal-based products



International cooperation

Novel Antiviral & Antibiotics Drug Screening



UNISPACE+50



Space and Global Health

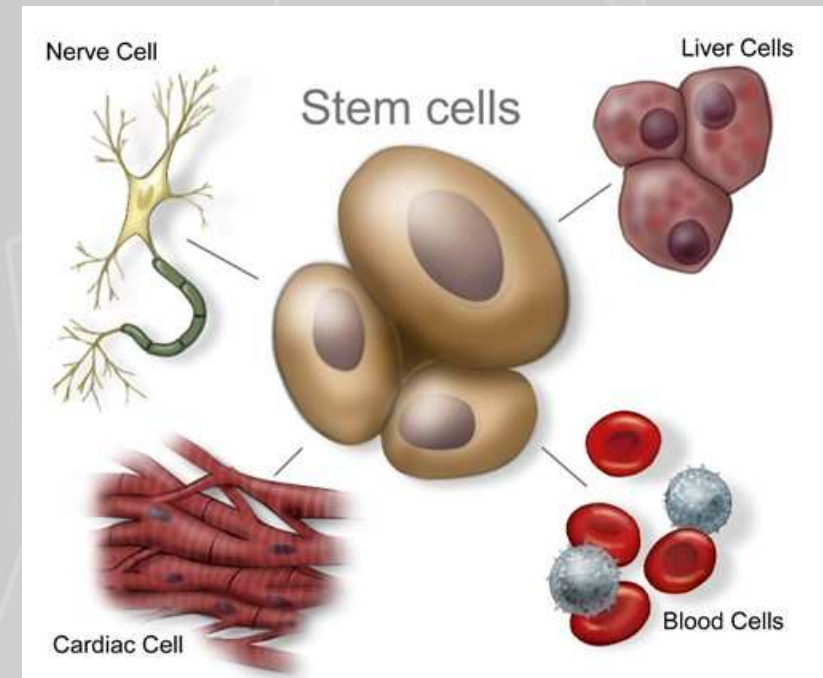
- Stem cell therapy
- Differential Gene Expression in Space



Current issues - Space agenda today

I. Stem Cells in Microgravity

- In both space-based and simulated-microgravity experiments, various types of stem cells and progenitor cells have shown distinct responses.
- Some types of cells show **increased proliferation** and viability. Others show **enhanced differentiation**
- Microgravity research has the potential to advance stem cell therapies by identifying novel cell properties and pharmaceutical targets



Current issues - Space agenda today

II. Bacterial Virulence In Microgravity



SPACE AND GLOBAL
HEALTH

- In microgravity bacterial virulence increases
- Experiments executed across a number of bacterial species reported a reduced lag phase, increased growth rate and increased final cell population densities under microgravity conditions
- In μG , bacteria were shown to become more resistant to common antibiotics and presented enhanced biofilm formation
- Discovering the factors responsible for growth and virulence of bacteria is very important
- Thus, microgravity has the potential to lead to the identification of novel regulation of genes, providing novel potential targets for vaccine and development of new antibiotic drugs



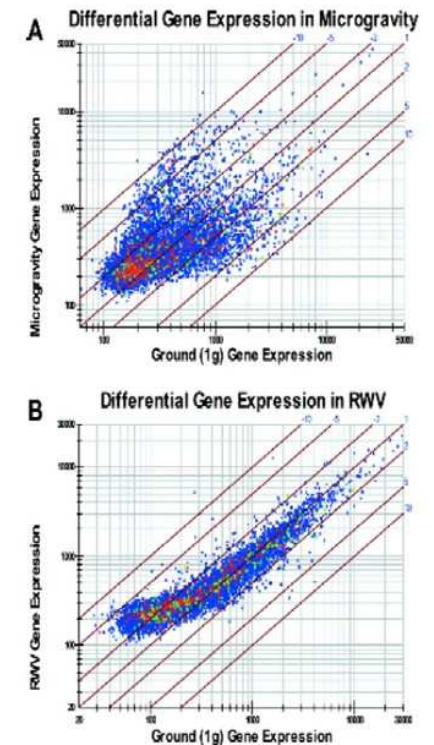
Current issues - Space agenda today

III. Differential Gene Expression in Microgravity

- In the absence of gravity, certain genes in cells turn off and others turn on. Studying these changes will allow scientists to develop a better understanding on how cells function and how to manipulate them in labs on Earth
- Out of 10,000 genes evaluated, 1632 genes were altered in μ G
- Genetic expression of cytokines (interleukins, interferon-gamma, tumor necrosis factor) in human cells is changed during spaceflight
- Expression of proto-onco-genes, c-fos and c-jun, in human epidermoid A431 cells flown on sounding rockets are altered



SPACE AND GLOBAL HEALTH



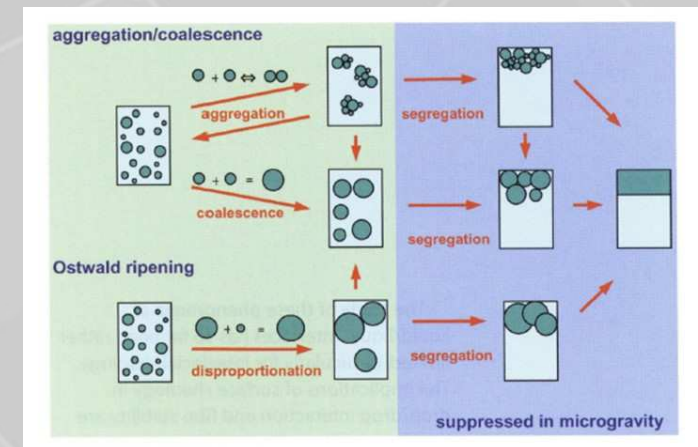


Current issues - Space agenda today

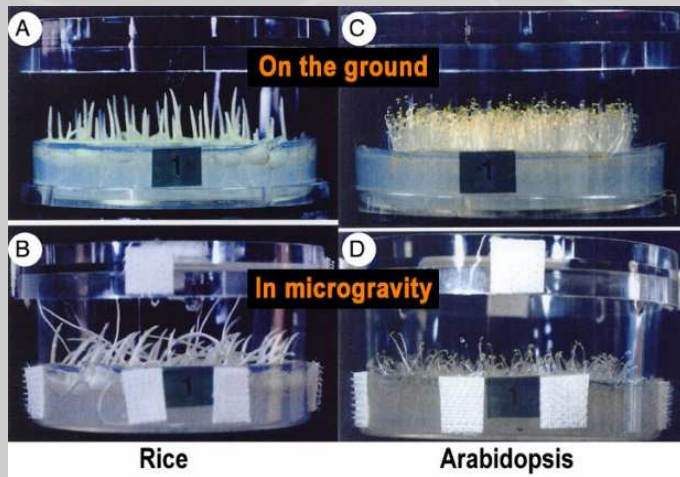
IV. Improved shelf-life of colloidal-based products

Examples of colloidal systems strongly affected by gravity include **macromolecular crystallization, self-assembly of proteins and polymers, liquid crystals, suspensions, emulsions and foams**

- Particles are under constant motion → aggregation → sedimentation & phase separation
- The behaviour is not well modeled (unpredictable) since gravity is a masking and catalytic factor
- The **lack of sedimentation and buoyancy in μG** helps understanding the process allowing differentiation between aggregation/phase separation and sedimentation



V. Space Farming: Plant Biology



Microgravity effects on plants growth

Exposure of cells to microgravity results in various cellular alterations that affect structure and function, including signal transduction, gene-expression, immune response and metabolism

V. Space Farming: Plant Biology

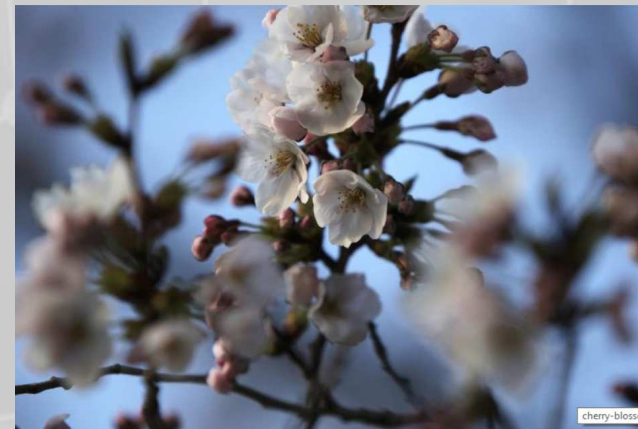


‘Space Cherry’ Tree Blossoms 6 Years Early Following Trip Aboard The ISS, Cosmic Forces May Have Spurred Growth

By *Philip Ross*
on April 12 2014 4:23 PM

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Microgravity enables the examination of fundamental plant biology and contributes to the understanding of main processes such as gravitropism, phototropism, and juvenility



SpacePharma's Solution – μ Gnify

Simple, Affordable, Accessible, End-to-End μ G solution:



Build Research Procedure



Customize Lab
for Research Needs



Place Lab in Microgravity
Platform



Control Microgravity Experiment
and Get Results

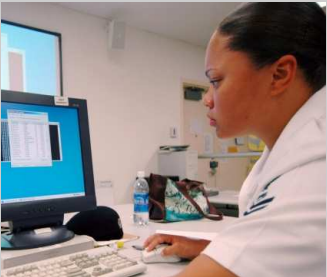
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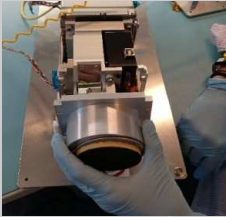
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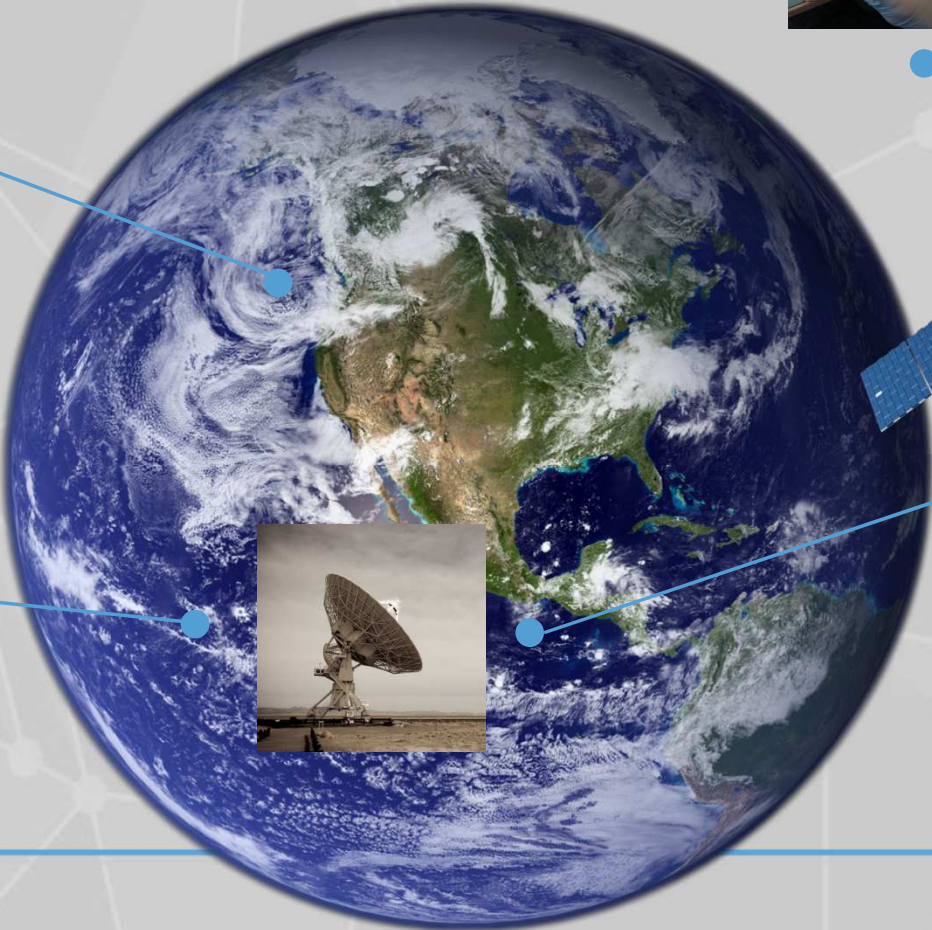
SpacePharma's Technology



Customers monitor & control experiment from their location



Experiment will be preformed in micro-labs inside the satellite



The results, including environmental reading, are received at SpacePharma's ground station

SpacePharma transmits the experiment protocol to the satellite.

SpacePharma's Technology

- Miniaturized Nano-laboratory
- Easily customized
- Fits inside multiple microgravity platforms
- Remote controlled by customers
- Flexible usage model
- Secured data protection



SpacePharma's First Satellite – DIDO1

Upcoming launch:

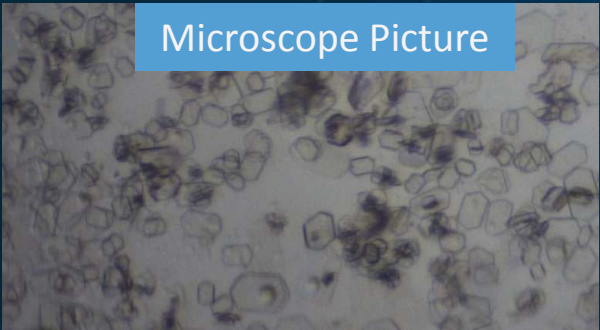
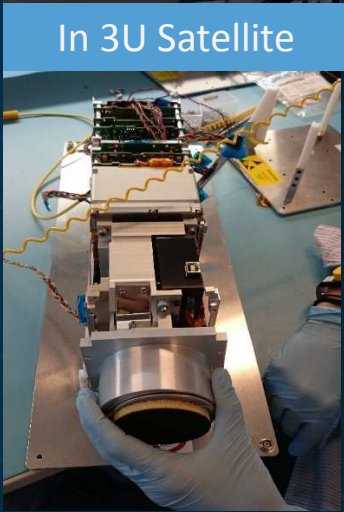
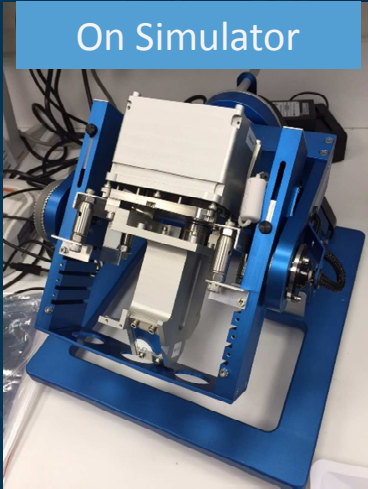
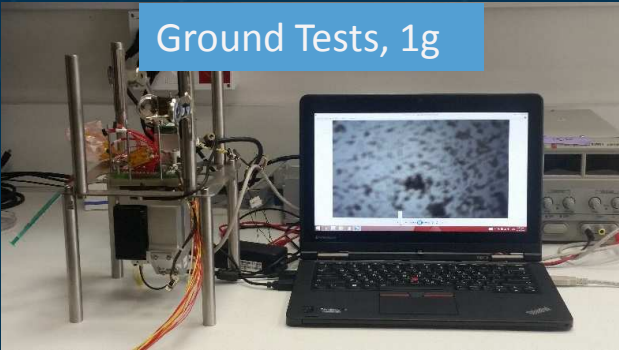
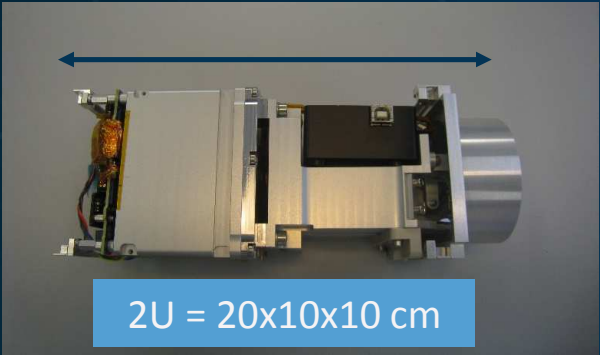
SPmgLab:

Bacterial growth, Antibiotics resistance, Self-assembly, Enzymatic reactions, Polymerization, Nanoparticle synthesis, Particle aggregation dynamics, Emulsion stability, Crystallization



SpacePharma's First Satellite – DID01

Upcoming launch:



Status

- Ground station : April 2016
- ITU frequencies : May 2016
- First satellite launch: May 2016
- First parabolic flight: August 2016
- 2nd satellite launch: August 2016



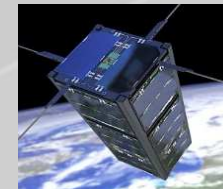
Ground Station Switzerland



Ground Simulator



Parabolic Flight



DIDO-I



Thanks for your attention

