Introduction of Shanghai Engineering Center for Microsatellites

2013.5

Shanghai Engineering Center for Microsatellites

SECM

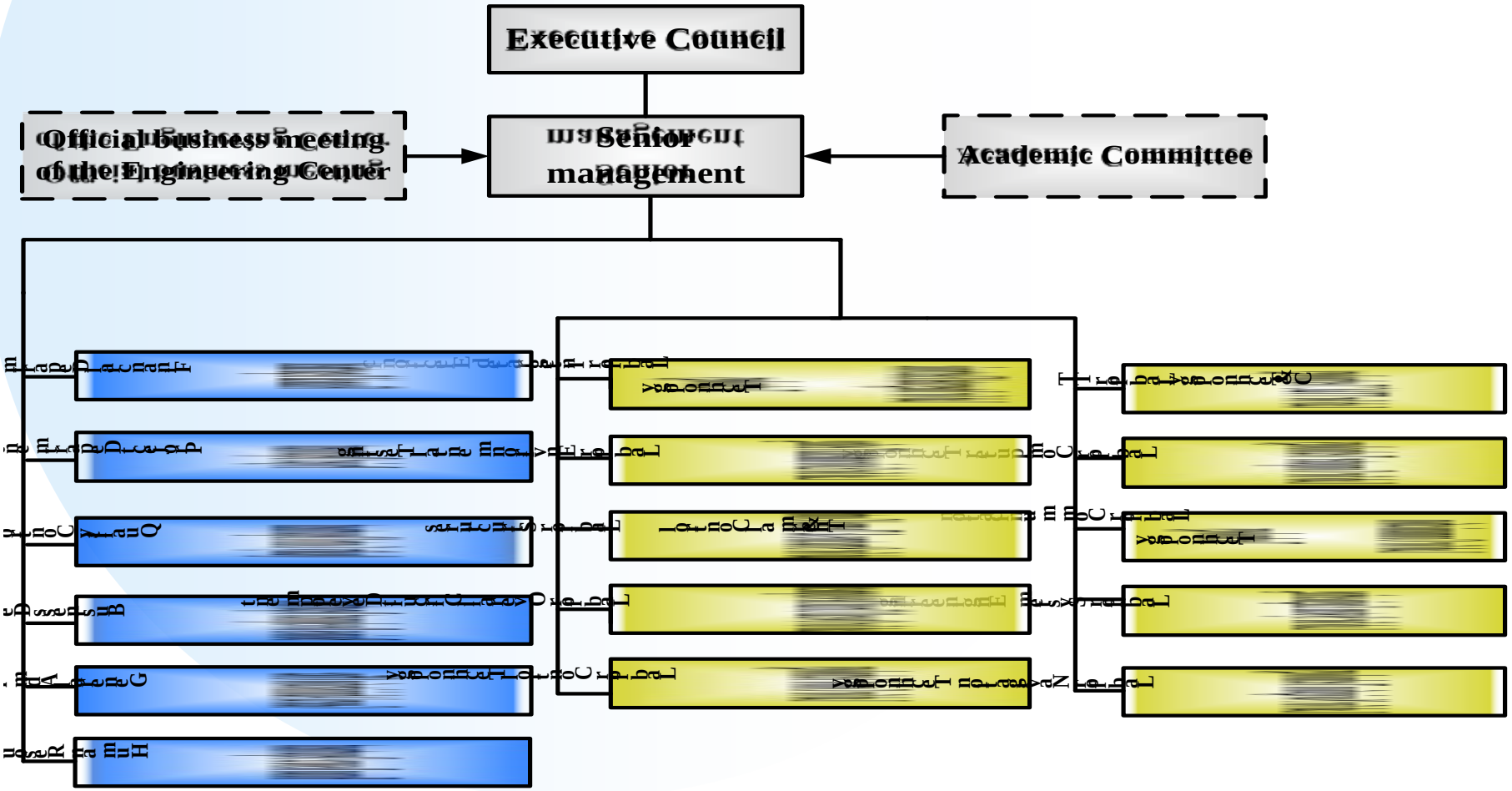
Content

History

- SECM was founded on Sep.15, 2003
  - Founded by Chinese Academy of Sciences and Shanghai City Government
  - Independent non-profit institution
  - To build a technical platform and innovation base for developing micro/small satellites

Organisation Chart

- Managed by the director under the guidance of Executive Council
- Comprised of 10 laboratories and 6 departments.



Personnel

PHD&Master: >72%

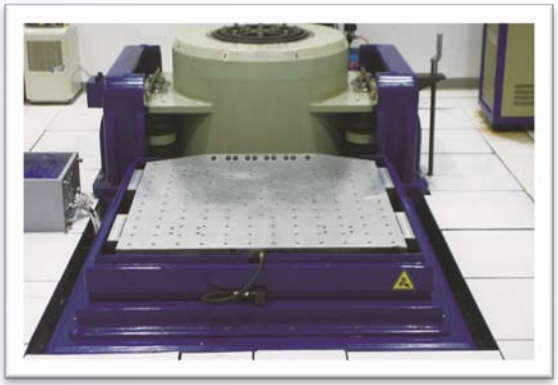
Age below 35: >84%

PHD&Master candidates: 30

Research Base

- Located in Pudong of Shanghai
  - Offices: ~ 15,000 m2
  - AIT area: ~12,000 m2
- Able to manufacture 8~10 satellites simultaneously

KM3



200KN vibration system

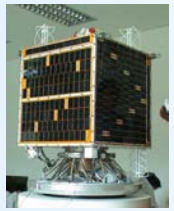
Bench test

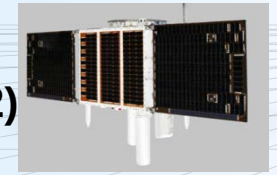
2. Missions accomplished

microsat

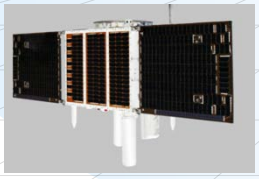
Communi-cation

2003 · CX-1(01)



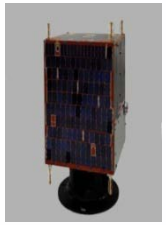


2008 · CX-1(02)



2011 · CX-1(03)

Companion satellite

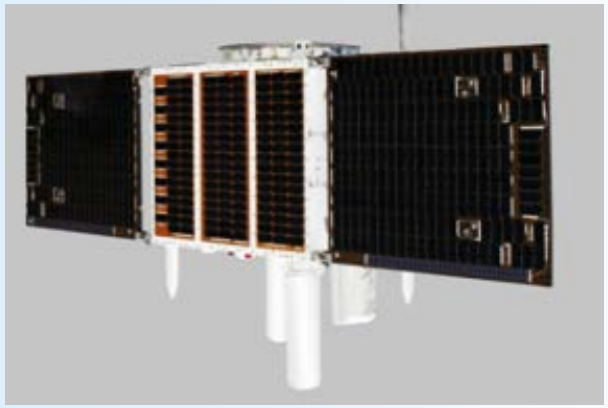


2008 · BX-1

Innovation-1(CX1-01)

- Mission: store & forward communication
- First LEO communication microsatellite of China
- Payload: multi-channel transmitter for LEO data relay
- First three-axis attitude control of SECM
- Mass： 88kg
- Orbit： 750 km
- Launch time: 2003.10

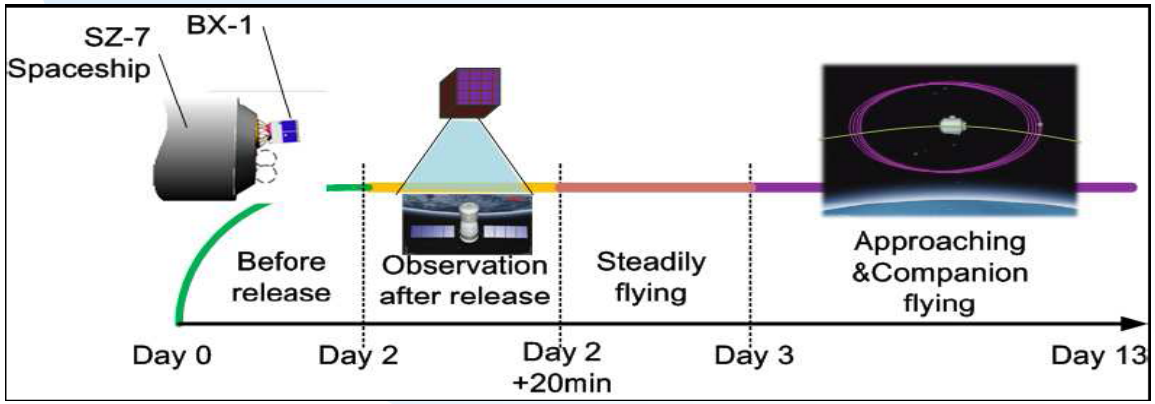
Innovation-1(CX1-02&CX1-03)



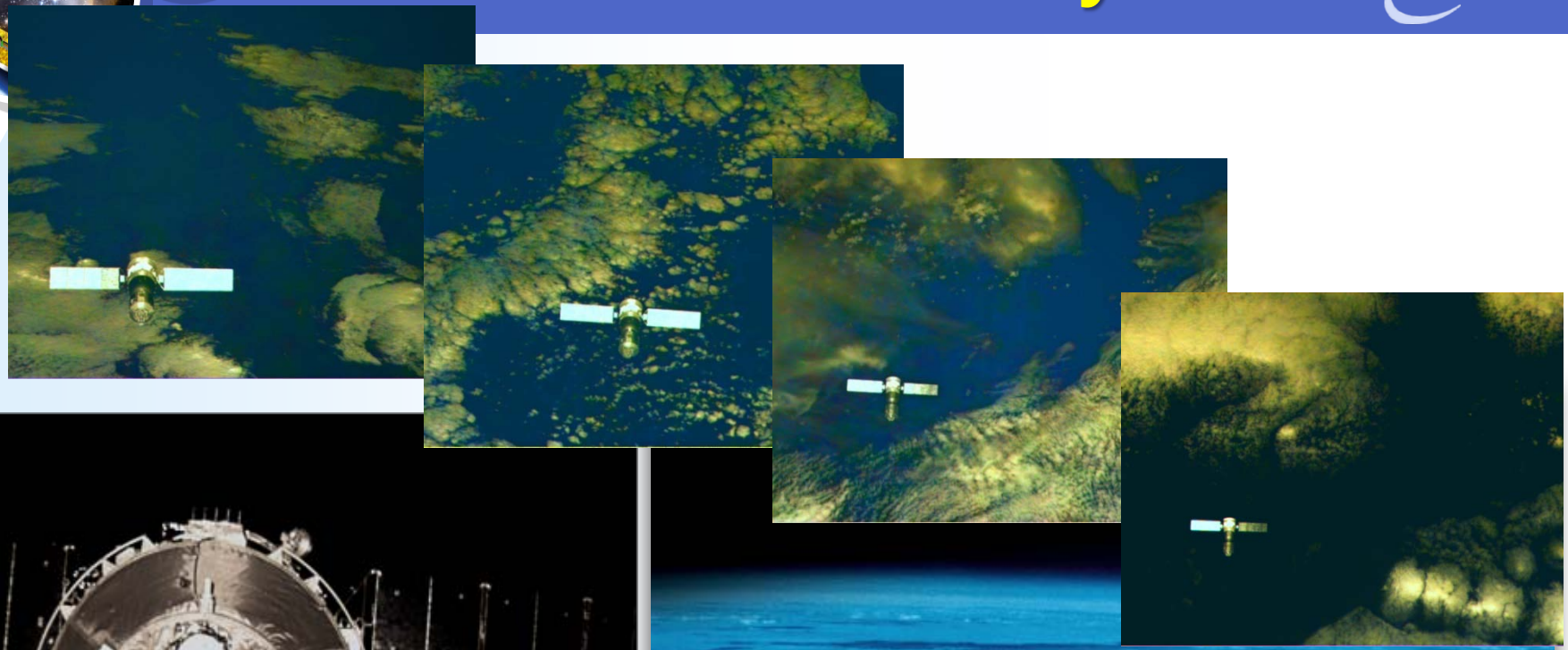
- Heritage from CX1-01
- Beam forming antenna
- Volume:0.9x0.9x0.8 m
- Mass： 217kg
- Power: 130W
- CX1-02 launch time: 2008.10
- CX1-03 launch time: 2011.11
- CX1-02 has successfully completed its mission to operate in orbit for 3 years, and is still in orbit servicing with CX1-03

BX-1: Companion satellite for SZ-7

- Mission: companion flying experiment
- Mass: 40 kg (including 1.0kg propellant)
- Dimension: 450mm ×430mm × 450mm
- Launched in 2008.9.25
- Release from SZ-7 spaceship in 2008.9.27
- Designed lifetime: 3 months
- life in-orbit : 13 months



Photos of SZ-7 by BX-1



Picture of SZ-7 spacecraft just after companion satellite released.

Photo of SZ-7 taken by BX-1 230 seconds after release

3. Missions Ongoing

microsat

Communi-cation	Science	Navigation
CX1-04	TANSAT	IGSO
	DMaHS	MEO
	QUESS	
	SVOM	

TANSAT

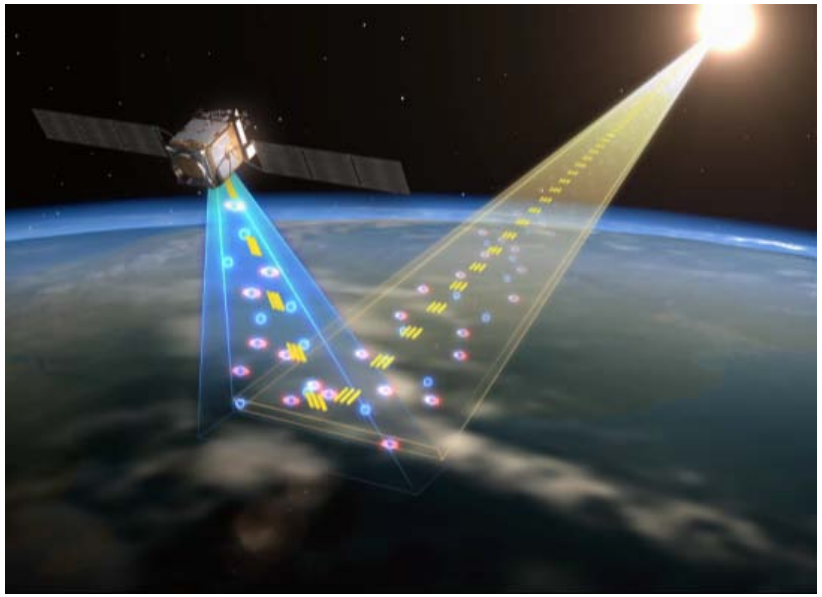
microsat

- Financed by NRSCC
- Global CO2 observation and monitoring
  - ✓ 4ppm CO2 retrieval accuracy
- Satellite Mass: ~600 kg
- Launch: expected in 2015
- Lifetime: 3 years

2011.01~2013.05
Phase B

2013.06~2014.06
Phase C

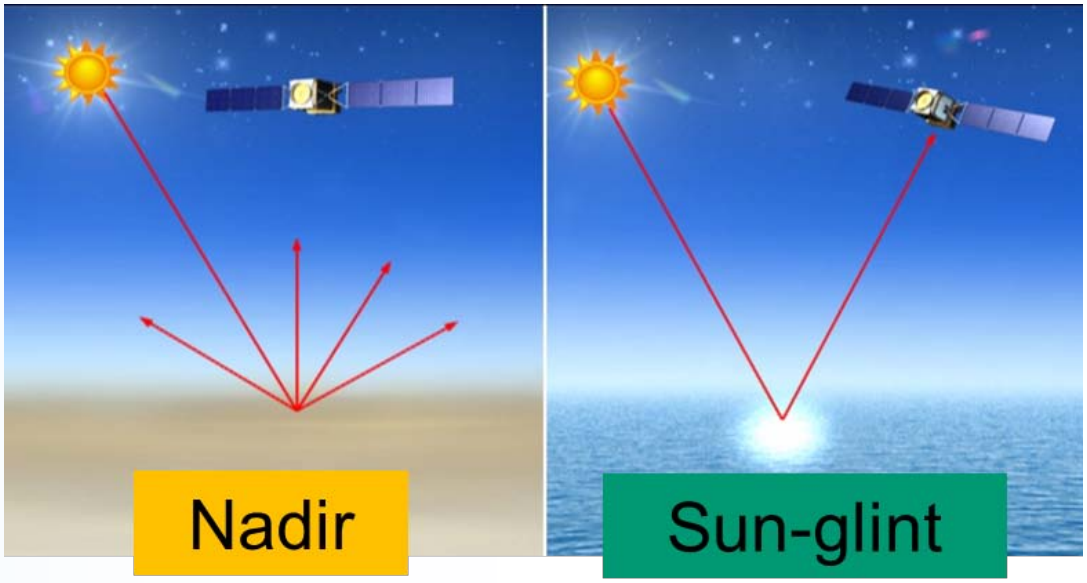
2014.06~2015.03
Phase D

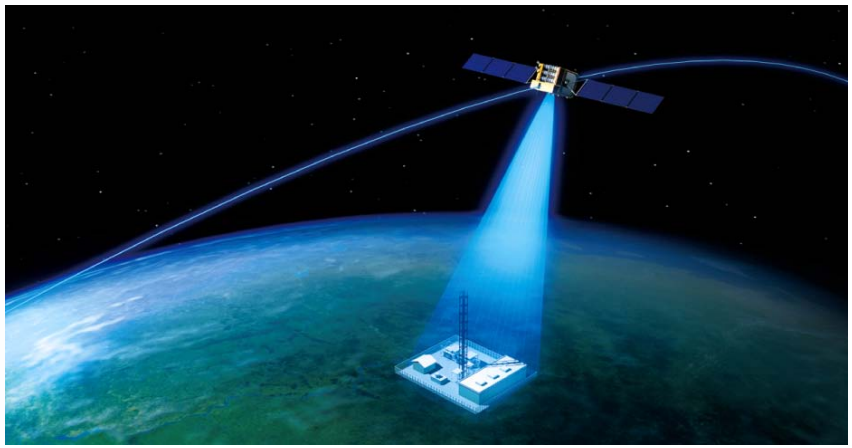


TanSat

Mission Modes

- Nadir mode
  - land observation
  - solar zenith angle<80 deg
- Sun-glint mode
  - Ocean observation
  - solar zenith angle <70 deg
- Target mode
  - ground-based validation sites
  - ~10 mins

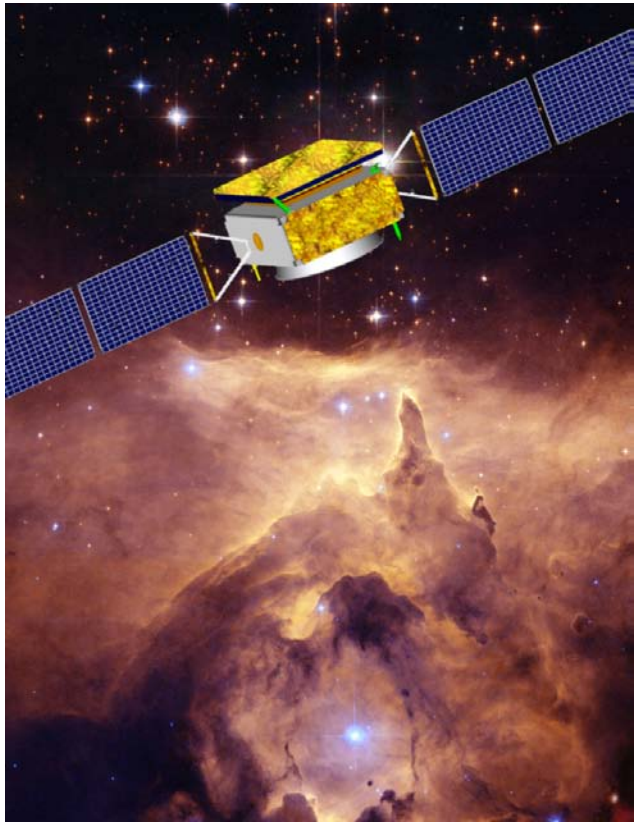




DMaHS: Dark Matter Hunter Satellite

microsat

- **Mission :**
  - Detect and study dark matter particles by gamma ray spectrum observation
  - Measuring TeV high energy spectrum, study the origin of universe ray
  - Research on transmission and acceleration of universe ray



2011.05~2012.10
Phase B

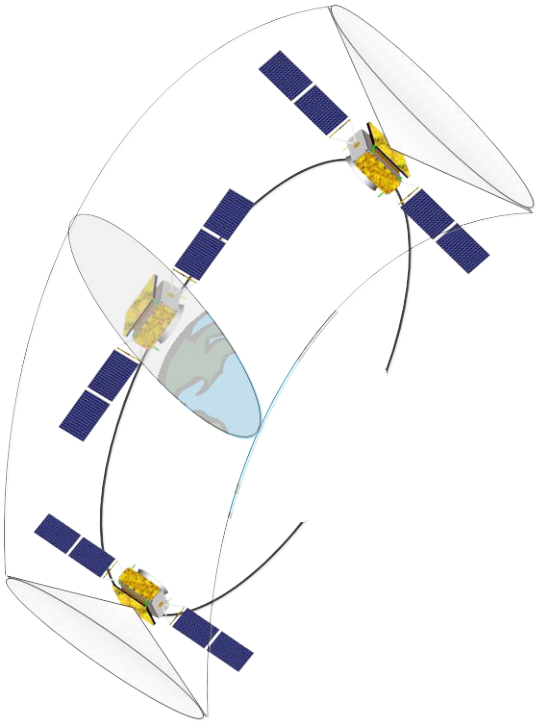
2012.10~2014.01
Phase C

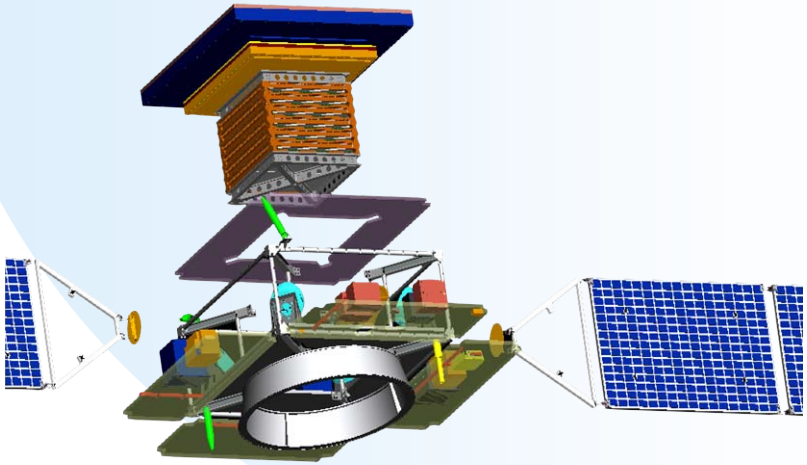
2014.01~2015.03
Phase D

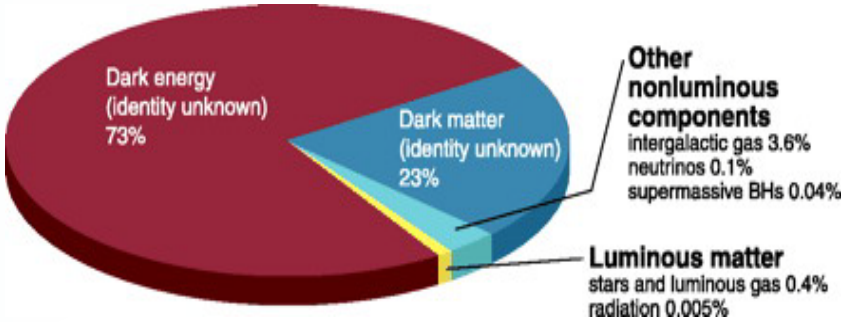
DMaHS Satellite

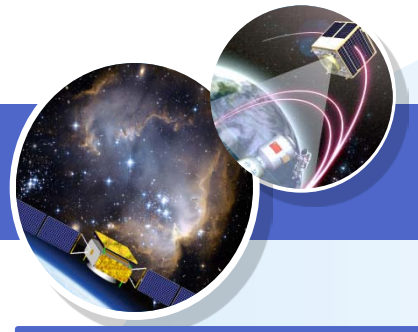
microsat

- Orbit: 500km Sun synchronous
- Mass: 1800 kg (payload 1400kg)
- Launch: expected in 2015
- Lifetime: 3 years





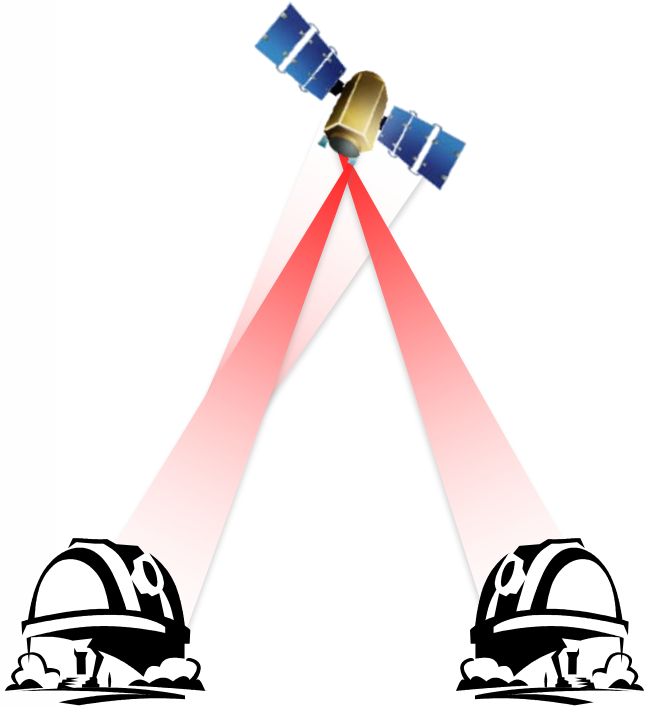




QUESS (Quantum Science Satellite)

microsat

- **Mission :**
  - Board-ground quantum key distribution test
  - Board-ground entanglement distribution test, ground-board teleportation test, experiment on quantum theory in space scale
- **Mass: ~500kg**
- **Lifetime: 2 years**



2012.01~2012.06
Phase B

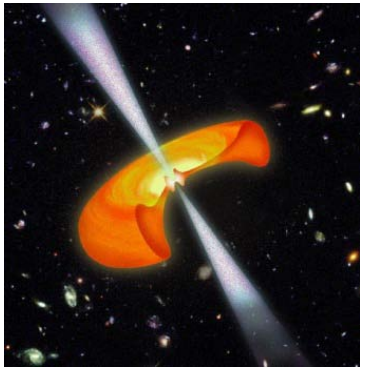
2012.06~2014.01
Phase C

2014.01~2015.06
Phase D

SVOM

microsat

- Detection of all know types of GRBs
- Provide fast, reliable and accurate GRB positions
- Measure the broadband spectral(from visible to MeV)
- Quickly provide redshift indicators of detected GRBs



Cooperation Project

cnes CENTRE NATIONAL D'ÉTUDES SPATIALES

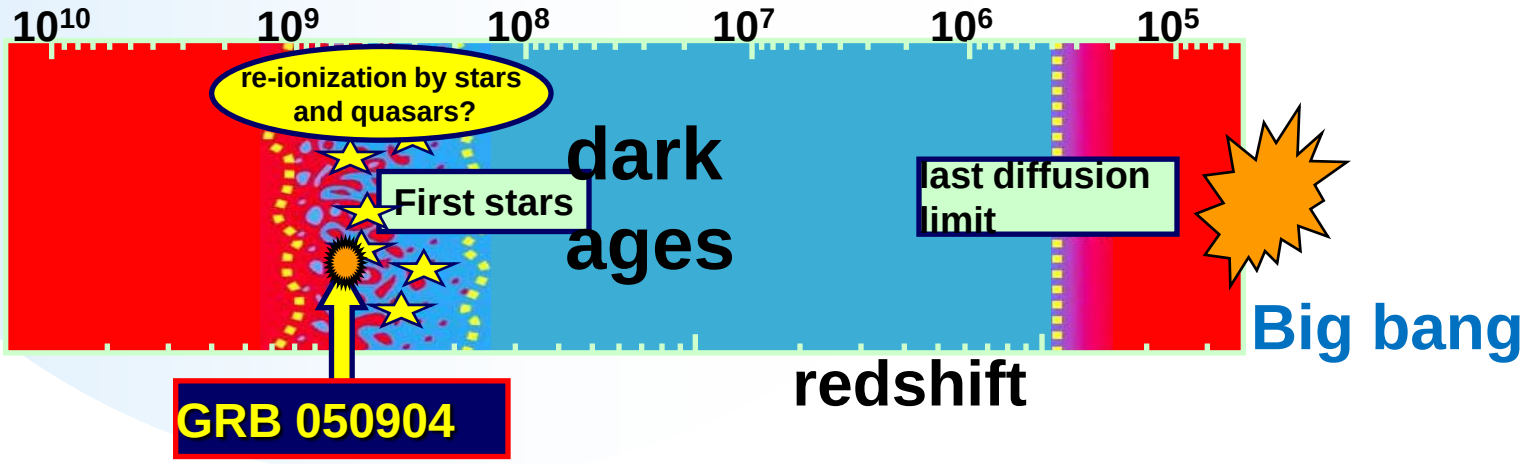
CNSA

中国科学院 CHINESE ACADEMY OF SCIENCES

dapnia cea saclay

microsat 上海微小卫星工程中心

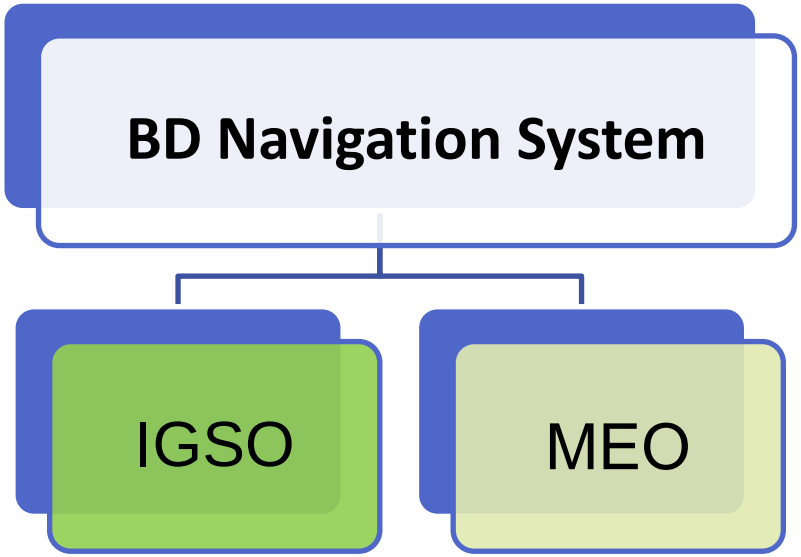
Time since the beginning of the expansion (years)

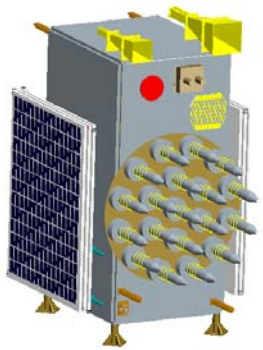


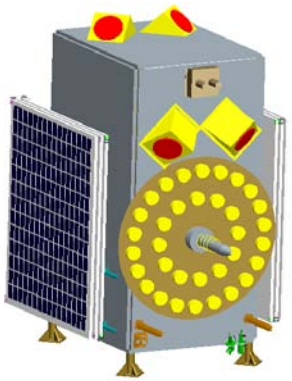
BEIDOU Navigation Satellite System

microsat

- **IGSO Satellite:**
  - Orbit: ~35,786km, 55° inclination
  - Mass: ~830kg
  - Power: ~1000W
  - Launch: expected in 2014
- **MEO Satellite:**
  - Orbit: ~21,528km
  - Mass: ~850kg
  - Power: ~1500W
  - Launch: expected in 2015

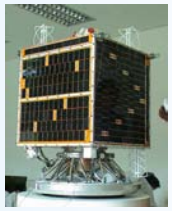






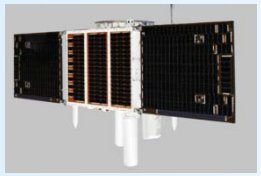
Near future...

microsat



SECM

2003 · CX-1(01)

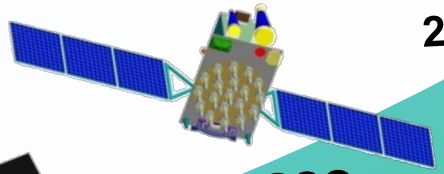


2008 · CX-1(02)

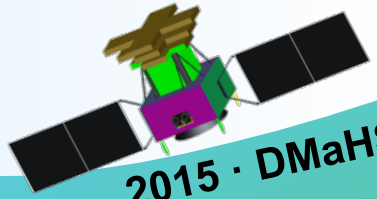
2016 · SVOM

2016+

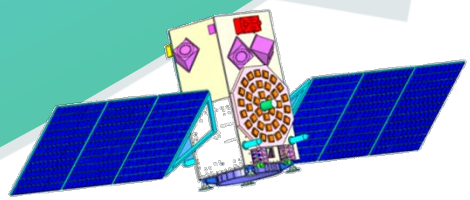
2008 · SZ-7



2014 · IGSO

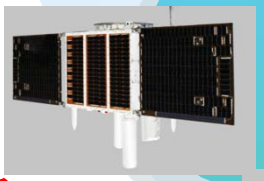


2015 · DMaHS

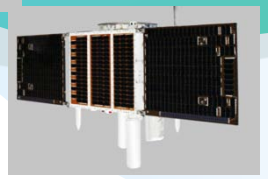


2015 · MEO

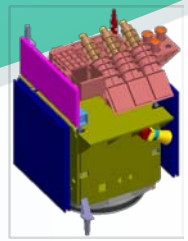
2013



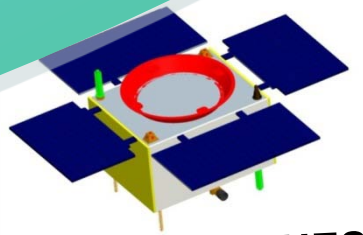
2011 · CX-1(03)



2014 · CX-1(04)



2015 · TANSat



2015 · QUESS


Thank You!