



Development and International Cooperation of China Space Transportation System

China Academy of Launch Vehicle Technology (CALT)
China Aerospace Science and Technology Corporation (CASC)





Space transportation system is the cornerstone of developing space technology and ensuring the space activities, the carrier of large-scale development and utilization of space resources, as well as the important impetus to the development of national economy.



China space transportation system is represented by Long March (LM) launch vehicles, and Yuanzheng (means expedition) series upper stages.



China space transportation system construction started in 1960s and has made remarkable achievements. Now, it has already grown up with the capability of rapid access to space, development and utilization of space. China has been always looking forward to extending international cooperation, developing space technology and sharing achievements with the world.



OUTLINE

Chapter 1 Achievements

Chapter 2 International cooperation

Chapter 3 Conclusion

A photograph of a rocket launch at night. The rocket is positioned in the center, surrounded by support structures. The launch is illuminated by bright orange and yellow flames and smoke at the base. Two tall, lattice-structured towers are visible on either side of the rocket. A semi-transparent blue overlay covers the middle of the image, containing the text 'OUTLINE' and a list of chapters.

OUTLINE

Chapter 1 Achievements

Chapter 2 International cooperation

Chapter 3 Conclusion

Achievements

- ❑ Development of China's space transportation system has experienced **5 phases**, and four generations with **17 types** of launch vehicles designed and manufactured, capable of sending the various payloads into **low, medium** and **high orbits**.
- ❑ Long March (LM) launch vehicles has conducted **244 flights** with **successful rate of 96%** until December 2016.



LM-2C



LM-2F



LM-3B



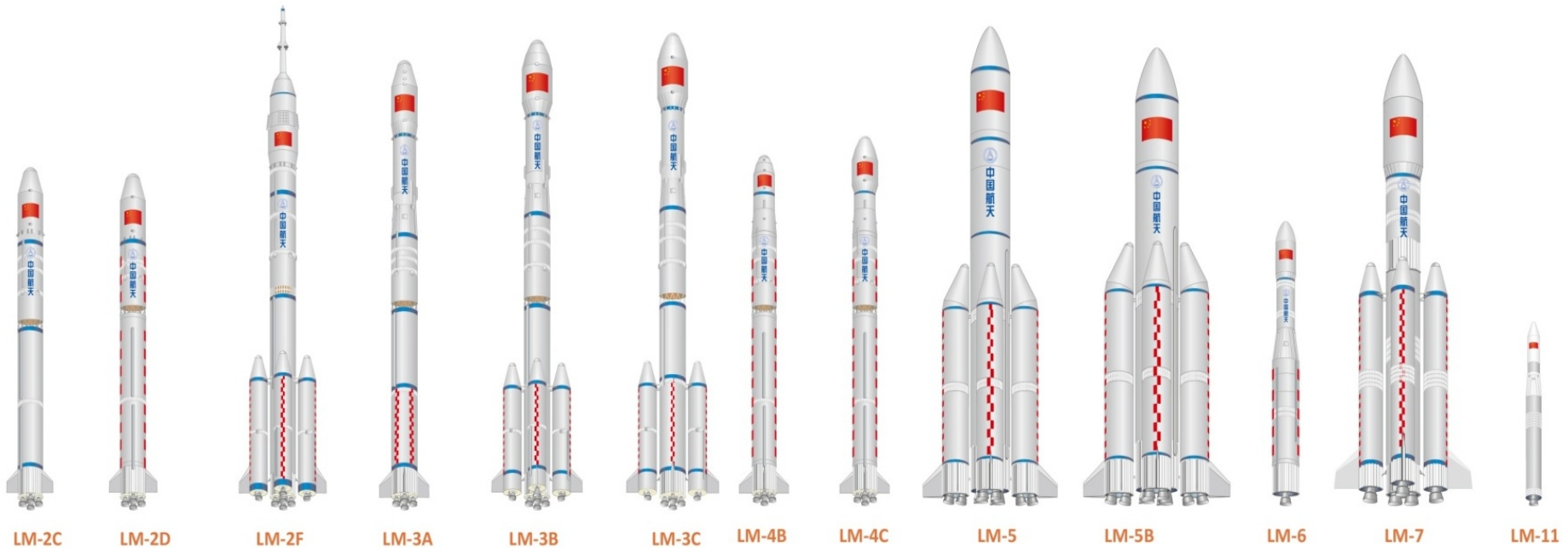
LM-7



LM-5

Achievements

- ❑ Major projects such as **manned spaceflight, lunar exploration, Beidou Navigation System** have been successfully implemented.
- ❑ LM Launch Vehicles have delivered different kinds of spacecrafts into **low, medium or high orbits.**



LM-2C SERIES LAUNCH VEHICLE



The LM-2C series, including LM-2C and LM-2C/CTS, provides both two-stage and three-stage types, with 43 m in length and 3.35 m in diameter. The series is mainly used for LEO, SSO and highly elliptic orbit satellite missions.

The standard payload adapter interfaces that LM-2C series adopt are 660, 937 and 1194A. Besides single payload missions, LM-2C series can also provide multiple-satellite and piggyback launch missions.

Satellites can be injected into different orbits by LM-2C from Jiuquan, Taiyuan and Xichang satellite launch center. Due to its high success rate, LM-2C series is the first launch vehicle awarded the Gold Medal Launch Vehicle in China.

CHINA ACADEMY OF LAUNCH VEHICLE TECHNOLOGY

LM-2F LAUNCH VEHICLE



LM-2F launch vehicle is dedicated for China manned space project. It includes two types, for spaceship launching and for space laboratory launching. The LEO launch capability of each type is 8100 kg and 8600 kg respectively.

Since LM-2F sent Shenzhou-5 spaceship and Chinese first astronaut into space in October 2003, China has made many breakthroughs in manned space technology, well on the way to realizing its three-step plan.

Till now, all 10 flight missions of China manned space project have been accomplished by LM-2F, including one Tiangong space laboratory module, 5 unmanned and 4 manned Shenzhou spaceships. It is a key support to the project.

Main Characters

| Parameters | Manned spaceship | Space laboratory |
|-----------------------------|------------------|------------------|
| Number of Stage | 2 | 2 |
| Overall Length (m) | 58.34 | 52.03 |
| Max. Diameter (m) | 3.35 | 3.35 |
| Lift-off Mass (t) | 497.9 | 497.9 |
| Lift-off Thrust (kN) | 5923 | 5923 |
| Number of Booster | 4 | 4 |
| Launch Capability(LEO) (kg) | 8100 | 8600 |



• LM-2F Space Laboratory Mission

CHINA ACADEMY OF LAUNCH VEHICLE TECHNOLOGY

LM-3A SERIES LAUNCH VEHICLE

The LM-3A Series, including LM-3A, LM-3B and LM-3C, is an important member of Long March Family. The launch vehicles in this series are mainly used for GTO missions.

LM-3A is a three-stage, liquid-propellant launch vehicle with GTO capability of 2600 kg.

LM-3B takes LM-3A as its core stage with 4 strap-on boosters. With GTO capability of 5500 kg, LM-3B is the most powerful launch vehicle currently operating in China.

LM-3C also takes LM-3A as its core stage with 2 strap-on boosters, providing 3800 kg launch capability to standard GTO.



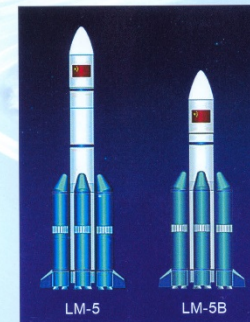
CHINA ACADEMY OF LAUNCH VEHICLE TECHNOLOGY

LM-5 SERIES LAUNCH VEHICLE



The under-developed LM-5 series launch vehicle is the new generation launch vehicle of China, mainly applied for manned space station, lunar probe, heavy satellite and multi-satellite launch missions.

LM-5 launch vehicle will take its maiden flight in 2014. It is a two-stage launch vehicle with a core stage of 5 m and 4 identical strap-on boosters of 3.35 m. Its lift-off thrust is 10572 kN. The GTO launch capability is 14000 kg.



LM-5 Series Launch Vehicle

The LM-5B launch vehicle is a single stage launch vehicle with 4 identical strap-on boosters of 3.35 m. Its LEO launch capability is 25000 kg.

Up to now, key ground tests, such as booster separation test, engine firing test and electrical system test have been carried out smoothly, verifying the key technologies of LM-5 launch vehicle.

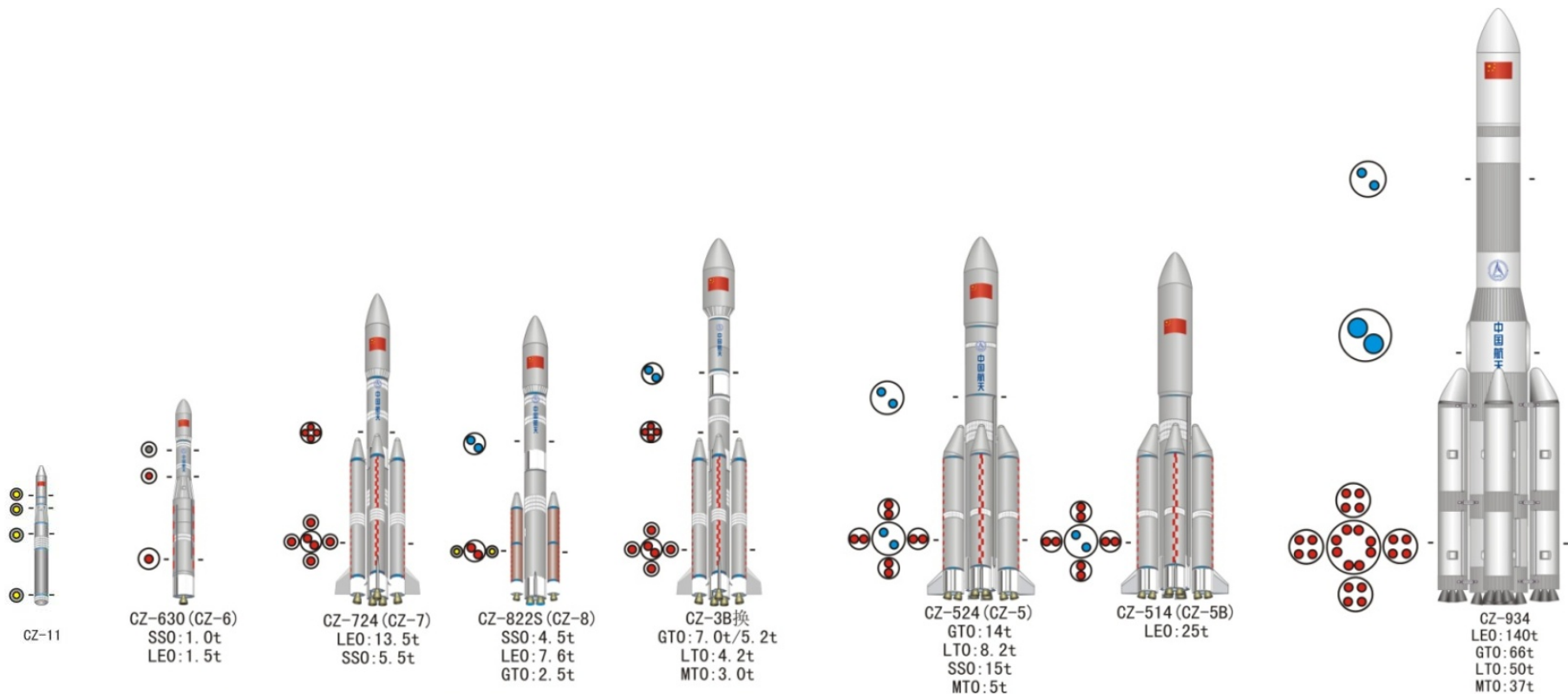
CHINA ACADEMY OF LAUNCH VEHICLE TECHNOLOGY

Achievements

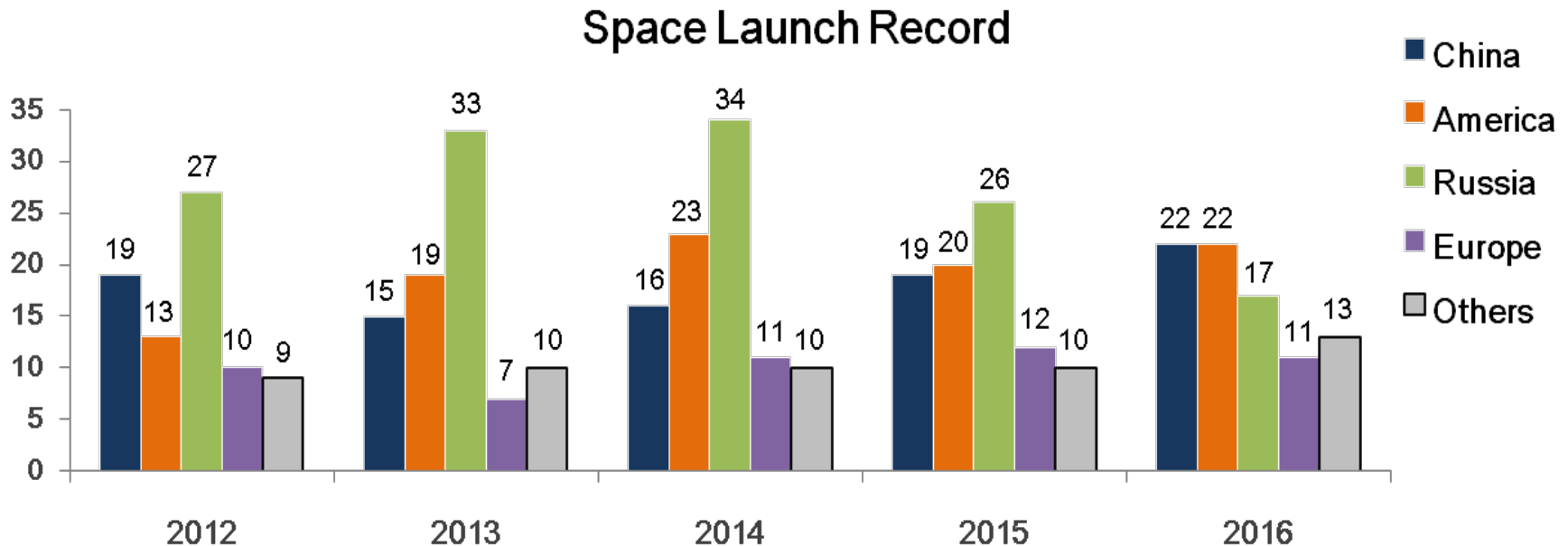
- ❑ On November 3rd, **Long March 5** LV (LM-5) accomplished her first flight, and delivered **over 14-tons** experimental payloads **to geostationary transfer orbit** (GTO).
- ❑ LM-5 also has the ability for **25ts to low earth orbit** (LEO), which makes her the biggest LV in China.



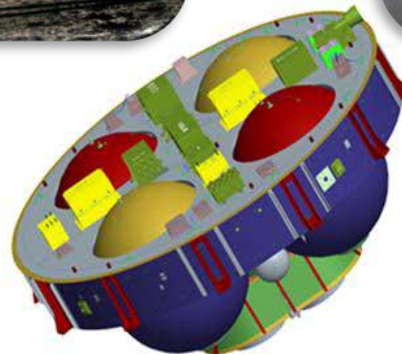
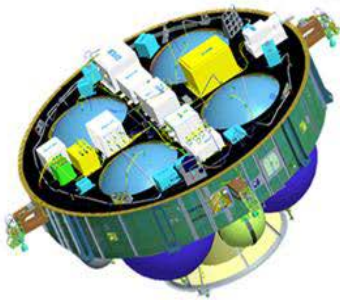
- ❑ China has developed new medium launch vehicles for SSO and GTO missions.
- ❑ The key technologies for **heavy-lift launch vehicle** are being demonstrated, which can deliver 140ts to LEO and 50ts to LTO. The project will be activated **in next five years**.



- ❑ **Independent manned space flight capability:** LM-2F of China and Soyuz of Russia becomes the only two launch vehicles that can conduct manned space missions.
- ❑ **Intensive launch:** From 2011 till 2016, LM Launch Vehicle has completed 91 launch missions, 18 launches per year on average and with success rate of 97.8%, both on leading position of the world.



- ❑ **Deep space exploration and space orbit transfer:** LM launch vehicles used for high orbits missions hold the capability to deliver deep space vehicles, with its capability for LTO and MTO missions being 8.2t and 5t respectively.
- ❑ **Upper stages of Yuanzheng series** can operate for 48 hours, and its engine can be restarted for 20 times. Upper stage is also named as “space shuttle bus” with strong flexibility and adaptability.



- **Four space launch sites:** China has formed a launch site network covering both coastal and inland areas, high and low altitudes, which provides various trajectories to satisfy manned spaceships, space laboratory modules, deep space probes and all kinds of satellites.



JSLC



XSLC



TSLC



WSLC

A large rocket launch at night, illuminated by ground lights, with a semi-transparent text box overlaid. The rocket is the central focus, with the Chinese characters '中国航天' (China Space) visible on its side. The launch is surrounded by tall service towers and a massive plume of fire and smoke at the base.

OUTLINE

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International Cooperation

- ❑ China conducts international cooperation on space transportation system by means of **piggyback launch** and **commercial satellite launch service**.
- ❑ LM Launch Vehicle family are reliable and have **fulfilled capability**.
- ❑ Based on development of space transportation system, **China is open to the world to provide commercial launch services**, such as full spectrum, great capability and strong adaptability.



International users exchange



Commercial satellite launch or piggyback launch service

International Cooperation

- ❑ **LM-3A** LVs have the capability of 5.5 tons for GTO.
- ❑ **LM-5** LVs meet the requirements of larger payloads, multi-satellite launch, lunar mission and mission to Mars.
- ❑ **LM-6**, **LM-7** and **LM-11** are mainly developed for SSO and LEO missions.



| Parameters | LM-3B | LM-5 | LM-6 | LM-11 |
|--------------|----------|---------|------------------|-----------------|
| Capacity (t) | 5.5, GTO | 14, GTO | 0.5~1, 700km SSO | 0.35, 700km SSO |

- ❑ **“Space ride”**: China’s LM launch vehicles has been launched over 200 times, which means rich piggyback chances for other countries. Potential piggyback capability and launch window will be published regularly and updated timely. This shall serve as a piggyback launch platform for developing and emerging space countries, which will promote the harmonious development of space industry around the world.
- ❑ **“Space shuttle bus”**: The launch mode of LM launch vehicles with Yuanzheng upper stages works like a “space shuttle bus”. Orbital deployment of piggyback payloads shall be achieved through cluster-launch of multi-payload.



具体配置

火箭代号:CZ-5B
发射日期:2018年
载荷轨道:LEO
剩余载荷:未定
尺寸包络:定

我要投送



项目信息

项目简介:
支持人数:237
已筹款数:13,000 RMB
众筹状态:众筹中
剩余天数:57 天
目标筹资: 2,000,000 RMB
众筹单位:西北工业大学
单位地址:陕西省西安市

70%

我要投送

A large rocket launch at night, illuminated by ground lights, with a semi-transparent text box overlaid. The rocket is the central focus, with the Chinese characters '中国航天' (China Space) visible on its side. The launch is surrounded by tall service towers and a massive plume of fire and smoke at the base.

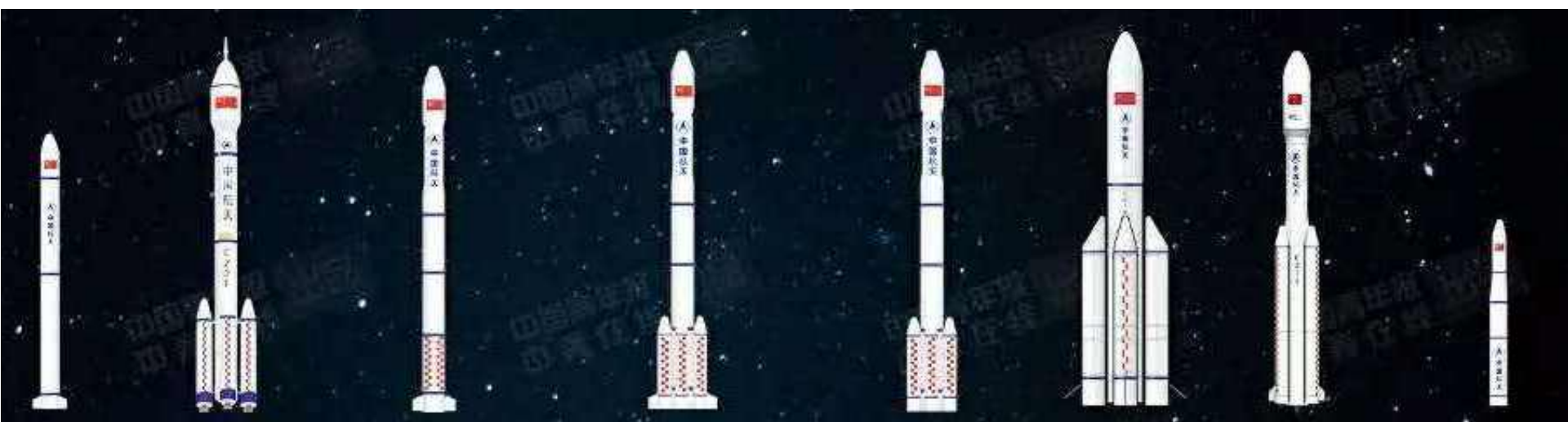
OUTLINE

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- ❑ After years of research and development, China space transportation system has achieved tremendous progress with the formation of major product and technology systems: **LM family**, and **Yuanzheng family of upper stages**.
- ❑ China has the capacity of delivering various payloads into predetermined orbits, and, with promotion of global space technology, we have conducted extensive international cooperation in the field of commercial satellite launch and piggyback launch.





Thank You



中国航天科技集团公司
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