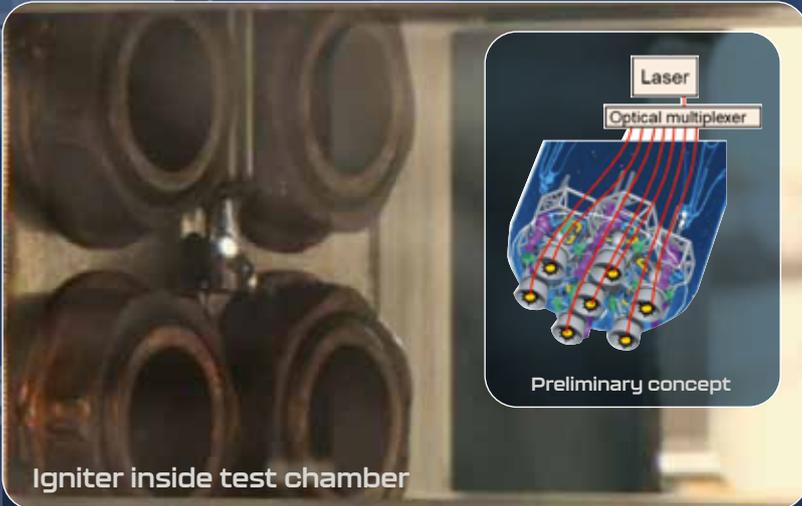


A more efficient and competitive way to space,
leading to new possibilities in the sky and on earth



Factsheet #1

Multiplexed Laser Ignition System



Igniter inside test chamber

For single ignition engines, pyro charges are a common choice for the ignition system. They are lightweight, compact, simple in operation and powerful. However, they can only be used once and need special care in handling.

Alternatively, torch ignition systems are frequently used for multi ignition rocket engines. These provide reliable ignition by the strong flame they introduce into the combustion device. Still, they need tanks, valves, lines, an initiator (e.g. a spark plug). These factors drive cost and complexity. The size of the tanks determines the amount of re-ignitions which are limited, though.

The proposed multiplexed laser igniter aims at using small, laser generated plasma spots to ignite the combustion devices of the engine. The laser head and the electronics are lightweight and compact. By using one laser and directing it via fiber to multiple locations, further advantages in mass can be achieved as well as beneficial effects on the costs. Furthermore, additional ignitions are mainly a matter of available electrical power.

Pros and Cons

- ⊕ Lightweight, small and flexible ignition technology**
The reduced size and weight of the laser ignition system and its components allow them to be easily placed in a wider variety of engine designs.
- ⊕ Risk Reduction**
No special precautions during launch preparation needed as e.g. for pyro charges or with loaded tanks.
- ⊖ Limited margins in operation**
Considering the effect of the laser power as well and environmental effects on the different components.
- ⊖ Limited margins in the ignition process**
Compared to the huge power provided by torch or pyro igniters.

Companies involved



- 1 4-fold multiplexer
- 2 Laser head
- 3 Ablative integrated target (with plasma)
- 4 Fibers & Igniter assembly

Key parameters



Flexible placement



Small size



Lightweight

Expectations for testing phase

Laser ignition on the Enlighten Engine Demonstrator project aims at demonstrating the capabilities of laser ignition on a full scale engine. This involves the functional and mechanical robustness as well as the usage on different combustion devices, i.e., thrust chamber and gas generator.

The demonstration is linked not only to the laser itself but also to the associated components including the fibers, the chamber interface pieces and the beam splitting device. Not only do these have to withstand the high energy laser pulses, but also the quite adverse engine environment.