New Scientist

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Space

Student rocket set for space launch

Imperial College London project will try to send its rocket to an altitude of 105 kilometres

Matthew Sparkes

A GROUP of students is aiming to become the first non-government, non-commercial team to send a reusable rocket to space. The team's Aurora rocket, set to launch from California this month, is designed to reach a top speed of Mach 5.2 and break through Earth's atmosphere.

The Karman Space Programme (KSP) was founded by students at Imperial College London two years ago, with the aim of breaking through the Kármán line, the 100 kilometre altitude that is widely recognised as the edge of space.

To achieve this, they designed and built a 540-kilogram rocket that stands 12 metres tall and is 50 centimetres in diameter – although it will be assembled for the first time at the launch site.

The craft consists of two separate stages, each with its own engine fuelled by liquid oxygen and ethanol. Aurora's first stage engine has an estimated 40,000 newtons of thrust, and the group says it is the most powerful non-governmental, non-commercial rocket engine ever built.

Each stage will fire for just over 20 seconds, and the rocket will be travelling at 5522 kilometres an hour at its peak speed. About 100 seconds after launch, it will reach its highest point and then should begin falling back to Earth for a soft landing by parachute.

To ensure the rocket passes the Kármán line, the team is aiming for an altitude of 105 kilometres. If successful, it will be the second student-led team to reach space, and the first to do it with a reusable rocket.

KSP's chairman, Shapol M., says the first student space shot – by a team at the University of Southern California in 2019 – was impressive, but that the rocket was single-use and had solid motors. It also isn't certain it reached space because of the margin of error in measuring its altitude.

Shapol says the KSP mission will use multi-stage liquid engines like commercial launchers, recover all sections of the rocket and could, in theory, be turned around for a second launch within 24 hours.

ENOCH WONG/KARMAN SPACE PROGRAMME

The Karman Space Programme team and prototype Vega rocket

The team is planning to launch Aurora from a site in the Mojave desert in California on 24 September. "Launching outside the UK is a huge pain, but there isn't a place right now to launch up to these altitudes in the UK. It's a real shame," says Shapol.

About 100 students have helped on the project, using AI to run simulations and metal 3D printing to fabricate parts. Some 25 have since graduated, but the rest are still working on the mission.

Imperial has allowed the rocket to be built on its campus, but isn't funding the project, so students have had to source corporate sponsors. The total cost was £150,000, says Shapol. "It really is the team that's powering this more than propellants," he says.

Shapol says it is hard to predict what will happen at launch, but preparations have included tests of many components. The team's previous rockets include Vega (pictured), powered by the same engine as Aurora's second stage. "We've tried to fail as much as possible before, so that we don't fail on the big one," says Shapol. ▮

Health

Enzyme test may let doctors diagnose Parkinson's earlier

HIGH levels of a certain enzyme in spinal cord fluid could be a sign of Parkinson's disease – potentially enabling the condition to be diagnosed earlier.

Parkinsonian disorders are neurodegenerative conditions that typically affect movement. They include Parkinson's disease and a related condition called dementia with Lewy bodies (DLB).

These conditions are usually only diagnosed once symptoms, such as slow movement or stiff limbs, appear. "It's quite difficult, even for experienced clinicians, to diagnose individuals with a Parkinsonian disorder, especially in its early stages," says Oskar Hansson at Lund University in Sweden.

To see if there might be a way to make a diagnosis earlier, Hansson and his colleagues carried out tests on 81 people with Parkinson's disease or DLB and 347 people who had no symptoms of the conditions.

They collected samples of each person's cerebrospinal fluid, which bathes the brain and spinal cord. In participants with Parkinson's disease or DLB, the fluid contained higher levels of DOPA decarboxylase – an enzyme involved in the production of dopamine – than in people without these conditions.

Among those who weren't diagnosed with a Parkinsonian disorder, 35 had raised levels of DOPA decarboxylase. After three years of monitoring, 12 of this group had developed Parkinson's or DLB. The researchers found the same link between levels of the enzyme and Parkinsonian disorders in another cohort of 94 people and in samples of blood plasma from a further 282 people (*Nature Aging*, doi.org/ktqm).

"It's quite difficult, even for experienced clinicians, to diagnose individuals with a Parkinsonian disorder"

If the finding is confirmed by larger studies, measuring DOPA decarboxylase could help diagnose Parkinsonian disorders earlier, says Hansson, although there is still no known way to prevent them. But identifying such biomarkers could also help us identify possible methods for treatment, he says. ▮

Chen Ly