

Space missions to visit the sun

Two space probes are to be sent to explore the Sun, in an attempt to get closer to the centre of the star than any previous mission.



ESA Solar Orbiter

By Richard Gray, Science Correspondent

The spacecraft will travel more than 70 million miles to one of the least hospitable regions of our solar system, where temperatures are hot enough to melt metal and intense radiation along with chaotic magnetic fields can tear manmade structures apart. Scientists hope the missions will help them answer a long list of questions that still exist about the sun, including why its outer atmosphere is hotter than its surface, and what causes solar wind, sun spots and flares.

The missions are to be undertaken by scientists at a major conference of solar physicists in Bournemouth this week. One of the missions, known as Solar Orbiter, will orbit the sun to give scientists a view of its poles, which have never been seen before. Led by the European Space Agency (ESA) with backing from NASA, the mission is expected to launch in 2017, and design work is already

under way. The spacecraft, fitted with a 15-inch-thick heat shield to protect it from the intense heat and radiation, will orbit at around 20 million miles from the Sun's surface - around two thirds of the distance between the Sun and Mercury, the closest planet. It will take the most detailed pictures of the Sun's surface ever achieved while also measuring particle emissions and magnetic fields. A second mission being planned by NASA, known as Solar Probe Plus, will enter the Sun's outer atmosphere, known as the corona, and fly just 4.3 million miles from the star's surface.

"The Sun influences us in many ways and is central to life on Earth," said Professor Richard Harrison, a solar scientist at the Rutherford Appleton Laboratory who was one of two scientists who originally proposed the Solar Orbiter mission. "Because the Earth orbits in a flat plane, the Sun can only ever be seen 'side-on'." Prof Harrison said:

"Although humans have been studying the Sun for millennia, we still know relatively little. One thing we have never done is to send a spacecraft to visit the Sun or looked at it from above or below."

Until now the spacecraft that have been closest to the Sun were the Helios space probes, launched in the 1970s.

They went 28 million miles from the star's surface, just inside the orbit of mercury, the innermost planet in the solar system.

The Solar Orbiter will be the size of a family car and will be equipped with a suite of instruments designed to map the Sun's surface while also measuring the chemical and magnetic environment around it.

It will use a two-layer-wide heat shield, made of metres of coated plastic and ceramics, to deflect the temperatures of more than 600°C along with the streams of highly energetic particles that pour from the Sun and could damage the spacecraft.

The ESA is expected to confirm its plans for the Solar Orbiter mission later this year. After using the gravity of the Earth, moon and venus to "slingshot" it in the right direction, it will take three-and-a-half years for the spaceship to reach its destination.

Once in orbit, it will circle the Sun every 150 days. Scientists hope it will attain an angle of 30 degrees off the Earth's orbit, to give views of the solar poles.

"It is a serious engineering challenge," said Dr Ralph Cordery, science and exploration business development manager at Astrium, a space company that has been charged with designing the Solar Orbiter.

"It is going to a place where the Sun will be heating down 20 times as much as it does here

on Earth. The leading edge is going to get up to about 600 degrees and we have got to make sure that it is room temperature inside the spacecraft."

Nasa is expected to call for proposals for instruments that can be included in its Solar Probe Plus mission later this year.

The \$750 million (£510 million) probe is planned to launch around 2015 and scientists hope both missions will be able to study the sun simultaneously.

Solar Probe Plus, which will be fitted with a nine-foot-wide, six-inch thick protective carbon foam shield, is expected take a total of seven years to fly the 90 million miles from the Earth to the sun and complete its mission.

It will slice through the upper parts of the Sun's corona, where it will have withstood temperatures of up to 2,000°C.

MYSTERIES OF THE SUN 1. Why is the sun's outer atmosphere, or corona, hotter than the surface?

Common sense says as you move further away from a fire, the cooler it gets, but the Sun does the opposite. The surface is 8,000 degrees C while the corona reaches one million degrees C.

2. How is solar wind generated? Solar wind is a stream of electrically-charged particles that are ejected from the Sun's atmosphere and accelerate to higher speeds to spread out across the solar system.

3. What causes coronal mass ejections? Massive clouds of particles thrown out by the sun were thought to be associated with solar flares, but have subsequently been found not to be related.

4. Can solar activity be predicted? Sun spots, which are dark spots caused by intense magnetic activity on the Sun's surface, and solar flares, massive explosions from the Sun's surface, were thought to run in an 11-year cycle, but the latest quiet period has gone on longer than usual.

5. What is going on in areas of low activity? From Earth, quiet areas of the Sun with no sunspots or flares look relatively uninteresting, but they are still a boiling mass of activity.

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Taiwan music festival pushes license within limits

KENTING, Taiwan (AP) - Couples fondle in public. A rock band tosses condoms to adoring crowds. Teenage girls gyrate in the streets.

Yet amid the pulsating rave music and free flowing alcohol at Taiwan's Spring Scream music festival, there is also a sense of self-control.

"My parents used to nag me about coming," said 22-year-old drummer Vincent Liu, who sports shoulder-length hair and nails painted bright pink. "But then they got used to it. Kids simply have to be responsible for themselves so that their parents don't worry about them."

His resolution to play by the rules is common among young Taiwanese, even those in the usually sun-swept beach resort of Kenting, where Spring Scream has been an annual event for 15 years.

While Taiwan has become more open and progressive, it remains a bastion of conservative values.

"Taiwanese young people... are influenced by the Confucian stress on acting properly," said Chang Yen-shen, a former director of Taiwan's prestigious Academia Historica, alluding to the hierarchical principles that have dominated social relations in much of East Asia for more than 2,000 years.

"Parents, society and schools all emphasize on a sense of responsibility."

That observation seemed to set the tone as this year's Spring Scream got under way earlier this month in Kenting's Erlunbi Park.

The festival opened under uncharacteristically leaden skies, with cawing groups of twenty-somethings in floral print beach pants and flip-flops congregating in the streets.

Jerry-built beer stalls crowded the fringes of a nearby Taoist temple, and palm trees waved in the breeze.

In an ironic twist, the festival's main events coincided with tomb sweeping day when Chinese honor their ancestors in somber rituals dictated by centuries of Confucian practice.

Under a light and intermittent rain, pulsating bands used Chinese lyrics to touch on hot-but-tonic issues for Taiwan's youth: nuclear power, the decriminalization of marijuana and faceless urban life.

"The odor of danger is permeating throughout the city jungle," intoned lead singer Chen Hung-yang of Lumay, which is named for a Japanese cartoon character. "My heart is crying and I am lost in the city jungle. I feel imprisoned and this feeling is expanding inside me."

Another performer tossed out condoms as he eyed his audience inquisitively and asked whether "anyone was getting any tonight?"

Spring Scream reflects "the impact Taiwan has felt as Taiwanese embraced liberalization on all fronts," said sociologist Lee Ming-sung of National Taiwan University.

Still, there was no confusing Kenting with Lalapalooza in the United States or the United Kingdom's Glastonbury. While small groups of people danced to the beat, most watched quietly on the expansive park lawn and clapped politely after each song.

To be sure, there have been media reports of drug abuse and other excesses at rave parties on the festival's fringes. But American Jimi Mox, who started Spring Scream with fellow Seattle native Wade Davis in 1995, insists, "We never had a drug or crime problem."



Taiwanese musicians rock out during the annual Spring Scream music festival in Kenting, Taiwan, Friday, April 3, 2009. Fans braved rain and cool temperatures to stream into Taiwan's southernmost spot for the island's longest running music festival. "Spring Scream" has morphed into an annual celebration of pop-culture and laid-back living since it began 14 years ago - an unusual counterpoint to the normally staid and reserved style that characterizes the Chinese-speaking world. (AP)

Jungle...

Then there was a shrill trumpet blast and all hell broke loose. And there was pandemonium as the beasts rushed past into the forest, some of them almost brushing against us crouched behind the anthill. I pruned to all 330 million gods ("tis-thun kotiyak dev devathan") in heaven while the ground shook and the trumpeting and roaring thundered above and around us.

Suddenly there was silence and we gingerly got up in the swirling dust. Saameel, totally relaxed, laughed aloud at my expression of terror. Looking quite amused and thrilled as a small child, he asked me, "mahathaya, kohomada wedey?". He laughed again seeing my aghast face. It was a moment I'll never forget but somehow I felt strangely confident that this tall, wild looking

man, knew exactly what he was about and would see that I would come to no harm.

Twenty years later, when in charge of this extensive region of Mahaweli systems 5 km from Mahiyangana to Welikanda in the north, I would constantly criss-cross this area. Mile upon mile of golden paddy fields along with newly built settlements and towns such as Girandurukotte.

Dehiattakandiya and Aralanagwila connected by smooth, carpeted highways would greet my eyes. I felt happy to see so much cultivation and the smiling faces of farmers taking loads of paddy to the mills. But then again, I felt a tinge of sadness when recalling the vast forests across the Uluhiya and the herds of elephants roaming the villas in those halcyon days.

TV GUIDE

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