

# SPACELINK LEARNING FOUNDATION

Link Up  
January 2014

For this month's  
Competition  
See page 4



## A review of last year in space: 2013 was a space-tacular!

**Near death experiences** 2013 was a year of fireballs and asteroids with a few spectacular firework displays from outer space brightening the sky! February saw the Chelyabinsk meteor streak through Russian air-space with a speed of over 18 km/s. The light shone brighter than the Sun and some eye witnesses could feel the heat from the asteroid. The rock exploded in the atmosphere about 23 km above ground level, creating more mini meteorites and a powerful shock wave. The most interesting fact was the fireball was undetected until entry, which caused lots of widespread panic. Over 1000 bystanders were injured, mostly from indirect effects rather than direct contact with the meteor.

Funnily enough, a different meteor was supposed to have a close flyby with the Earth during the same time period in February. Duende 367943 was discovered in February 2012 and calculations showed it was due to pass very close to Earth in 2013. There was however, only a 1 in 3030 chance that the asteroid would impact the Earth. 16 hours after the Russian impact, Duende passed just 27,700 km from the surface of Earth.

## **Will-they-won't-they-comets**



Comet ISON had everyone watching with baited breath in 2013 as it approached the Sun and the Earth in time for Christmas. Throughout the year observations showed that there was a 50:50 chance of the comet surviving its close encounter with the Sun, meaning that it could have been bright enough to see in the daytime December skies. Sadly ISON disintegrated in late November during its perihelion passage and we lost sight of the comet for the foreseeable future.



**spacelink**

Learning through space

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**Mars** Curiosity has now spent 500 Sols (martian days) on Mars. Her new years resolution is to search for the building blocks of life - organic molecules - which might be preserved in sedimentary rock on the red planet. NASA's rover recently found evidence of an ancient lake which had certain chemical ingredients in it. These include clay minerals that could have sustained microbial life forms for long periods of time, and it is possible that these habitable conditions persisted on the Red Planet until a more recent epoch time previously thought.



**The Moon** China landed a probe on the Moon in December 2013, showing that they could 'soft land' something successfully. This is important for future plans to land Chinese astronauts on the Moon. The spacecraft deployed a six-wheeled, solar-powered moon rover called "Yutu" or "Jade Rabbit". It is planned that the rover will photograph and study the Moon's surface using four cameras and two mechanical legs for digging while the stationary "lander" will conduct studies of its own.

**NASA funding** There were many changes to the agency this year and restructuring and reshuffling had a bad impact on funding for planetary science and science education. On the 3rd of December, NASA's planetary science division announced a restructuring of how it funds its various research and analysis programmes. The reshuffle eliminates a large list of funding programmes and has reorganised them into five themes: emerging worlds, Solar System workings, habitable worlds, exobiology and Solar System observations. The final decisions on how much of the budget is going to be cut will be made during 2014.

**Privatisation of space** The robotic Cygnus spacecraft made a historic rendezvous with the International Space Station this year, possibly changing history and the way the ISS is resupplied. It is a huge milestone for NASA's Commercial Orbital Transportation Services program and more official cargo delivery mission to the space station will be set up for 2014. The Cygnus spacecraft is 5 metres long and was built by Italy's Thales Alenia Space. It is powered by a service module containing two solar wings for power, as well as rocket thrusters. The spacecraft is designed to carry up to 2,000 kg and is designed to burn up in Earth's atmosphere at the end of the mission.

**The ISS and Chris Hadfield** Commander Chris Hadfield spent 5 months on the ISS in 2013 and he chose an unusual way to say goodbye when he returned to Earth. He shot a music video! His video is a tribute to the David Bowie song "Space Oddity". At one point he sings "And I'm floating in a most peculiar way" while actually floating in mid-air. The music video shows Cmdr Hadfield floating inside the space station while playing his guitar. It is believed to be the first music video filmed in space!

**Who knows what 2014 will bring for space!**



Dr Sheila Kanani



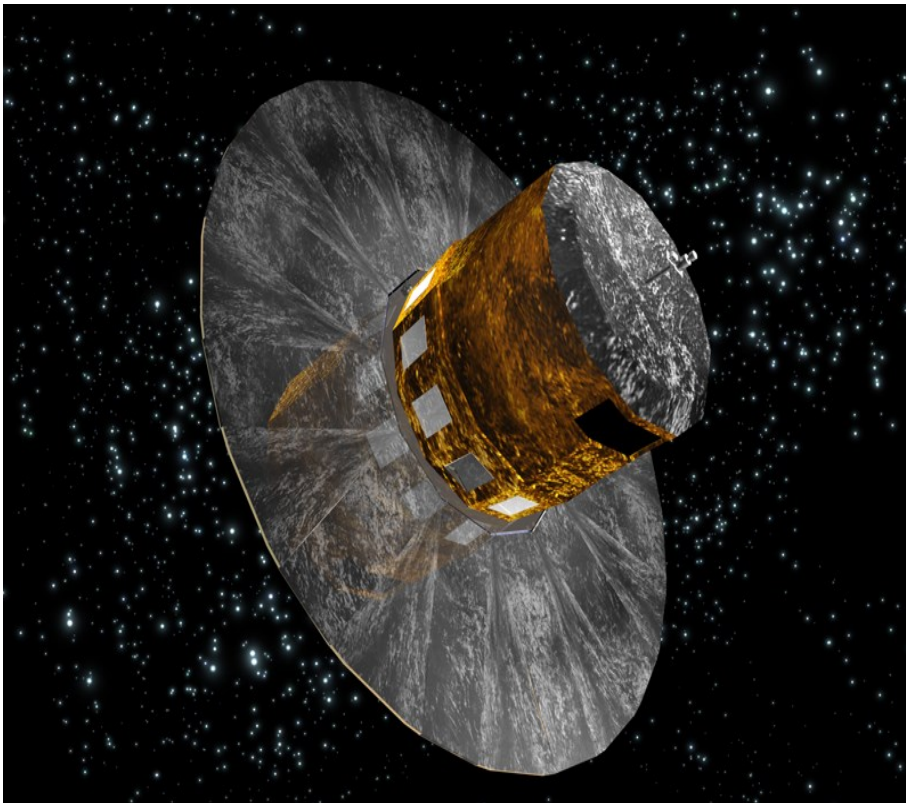


Fig 1

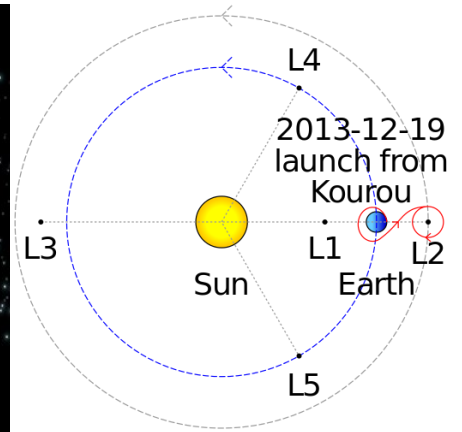


Fig 2

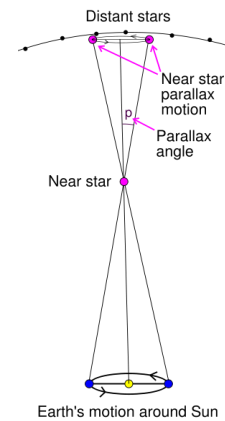


Fig 3

Earth's motion around Sun

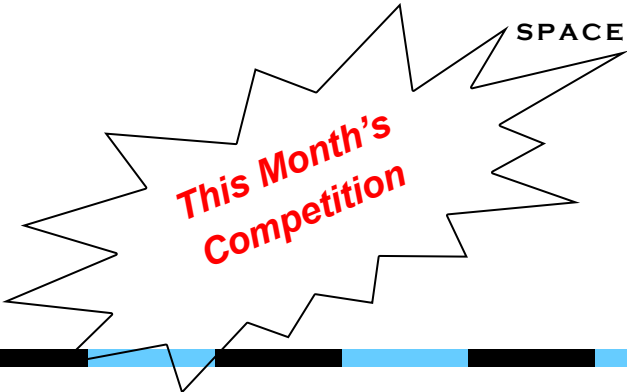
**The launch of Gaia**

This month, I thought I would talk about the launch of one of the most important telescopes to be built in the last decade: Gaia (figure 1). This telescope will map the position and velocity of 1 billion stars in the Milky Way. This is only 1% of the number of stars in our galaxy, so a small number in comparison. Gaia was launched on the 19<sup>th</sup> December from French Guiana and is currently heading towards the Earth-Sun L2 point (figure 2). This is where the gravitational pull of the Sun is equal to the gravitational pull of the Earth. This means that spacecraft will only need a small amount of fuel to stay in this orbit. The telescopes are able to see stars that are 400,000 times fainter than what we can see with our own eyes and are protected by a sunshield. They are so accurate that they could revolve a coin on the Moon from Earth's orbit. The star's position and velocity will be measured using a technique called parallax (figure 3). This works by measuring the movement of stars across the sky as the Earth orbits the Sun. Since we accurately know the distance between the Sun and the Earth, we only need to know the angle the stars move by to measure the distance (an angle of 1 arcsecond (1/3600 of a degree) corresponds to a distance of 3.26 light years from the Sun and this is where the term "parsec" comes from). Gaia will not only give us information on the velocity and position of stars, but will also give us information on the evolution and the types of stars in our galaxy and how our galaxy works. Gaia will also measure the orbits and angle of the orbits of extra-solar planets, the atmospheric conditions of all the stars observed (up to 30,000 light years away), asteroids between the Earth and the Sun, evidence for Albert Einstein's general theory of relativity and Gaia could detect up to 500,000 quasars. This telescope is expected to revolutionise astrophysics in the next decade and the final complete catalogue of stars is expected to be ready by 2020.



David Shelton





### GAIA Drawing Competition

Just before Christmas, a space telescope called GAIA was launched. To find out more read the article in this newsletter.

Draw a picture of what you think Gaia may see. Drawings should be no bigger than A4, and must be hand drawn or painted, not computer generated.

There will be cash prizes of £20 for the winner of each group, and runner up prizes.

The two groups are: Up to age 11 and 12—16 years of age. Your age, name and school must be Included with your entry.

Entries must be received by Friday 28th February 2014 and may be emailed to:

[competition@spacelink.org.uk](mailto:competition@spacelink.org.uk)

OR posted to: Spacelink Competition , c/o Broadwater School  
Summers Road, GODALMING, Surrey GU7 3BW.



Competition Prizes

#### Competition Rules

Entries are restricted to one per student

Results will be published in the March edition of Link Up

Posted entries cannot unfortunately be returned

By entering you are agreeing to your name and school being published on a winning list

Spacelink is compliant with the Data Protection Act and will not pass your de-