

## Astronomy Talk 10<sup>th</sup> October 2023

### Left in Space

We welcomed back Dr Lilian Hobbs, who gave this talk from the hall at BNSS as a hybrid talk. 10 attended in the hall, and 42 online.

Firstly, we covered debris on the Moon, where there are now 183 tonnes of stuff left behind or landed there, including from the Apollo missions where everything not needed for the return to Earth was thrown out, including human excrement. Gene Shoemaker's ashes have been left there as well.

In Earth orbit there are more than 23,000 golf ball or larger fragments, an estimated 670,000 larger than 1 cm, including exotics such as Ed White's glove (which burnt up on re-entry), and bits of 32 nuclear reactors; also an estimated 128 million in the range 1 mm to 1 cm.

In 2007 a Chinese and a Russian satellite collided, increasing the number of objects by 70%, and in 2009 an Iridium satellite collided with a dead Russian satellite, creating about 1,500 bits of debris.

26,000 objects are being tracked and near misses are common. There are an estimated 6,000 tons of objects, and more than 50% of Low Earth Orbit (LEO) near misses involve Starlink satellites. Fylingdales in North Yorkshire tracks anything in LEO larger than a coke can.

We are starting to look at how we might clear all this up, and proposals include nets, harpoons, and lasers. It has been proposed there should be a \$235,000 fee for orbital use per satellite.