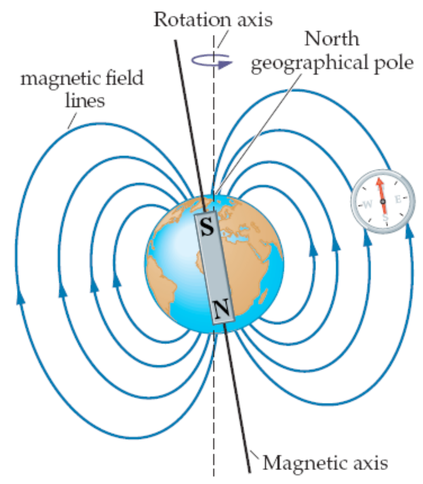
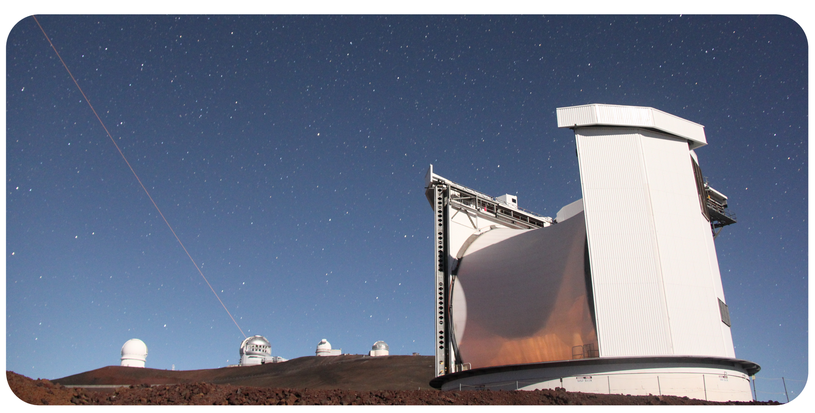
East Asian Observatory: JCMT
Magnetism & Polarization in Space

James Clerk Maxwell Telescope
East Asian Observatory

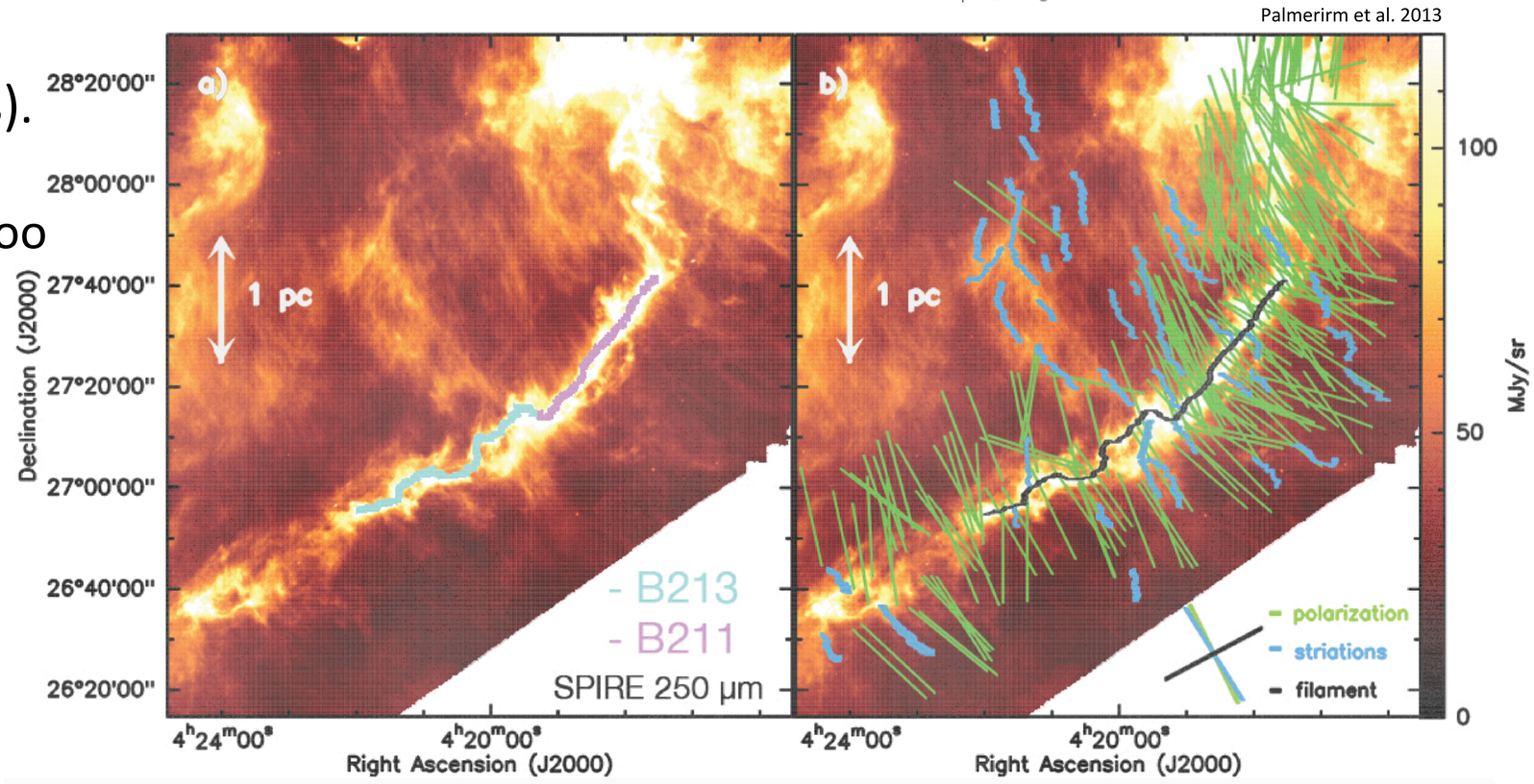
On Earth we can use a compass to know where Earth's magnetic poles are. In space many objects and regions are associated with magnetic fields. Magnetic fields protect planets from harmful radiation. In star-forming clouds magnetic fields might help prevent the collapse of a cloud (think of two magnets repelling each other), or funnel material into new regions along the magnetic field lines.



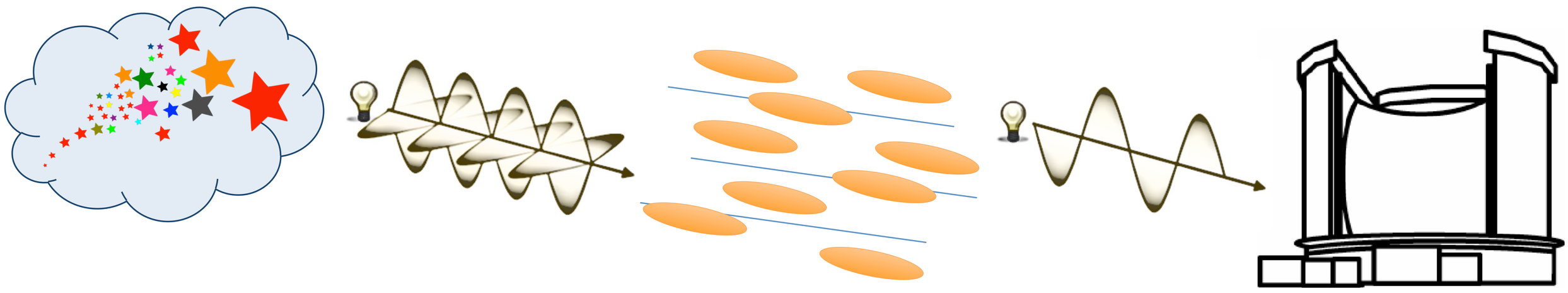
The JCMT observes at wavelengths between 1.3 and 0.45mm (microwaves). We do not use magnets to detect astronomical magnetic fields, as they are too far away. We use polarization.

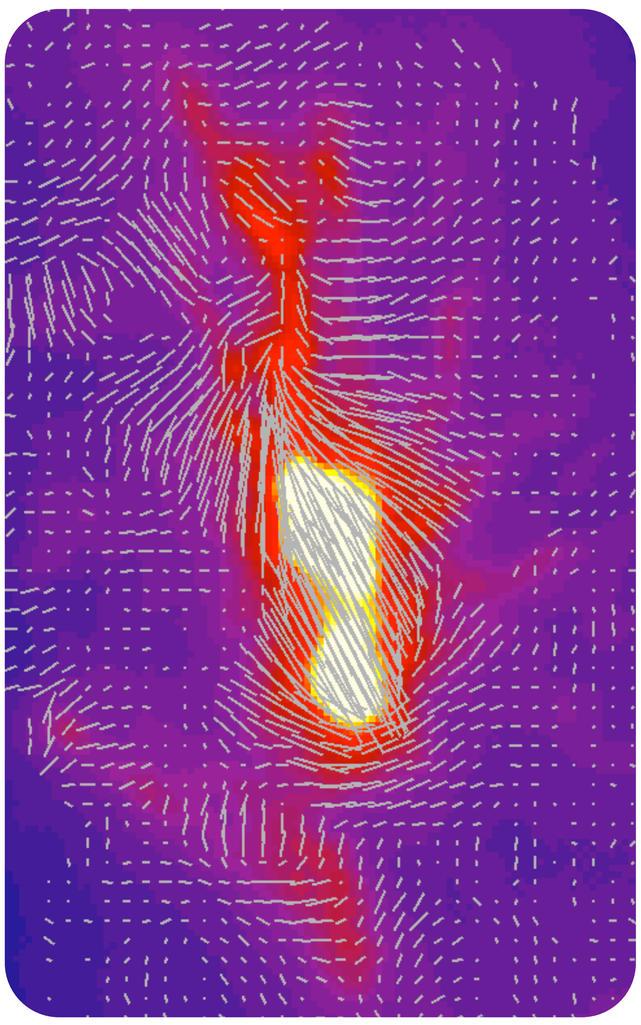


Palmerirm et al. 2013



Dust grains exposed to a magnetic field become aligned to that field. Radiation emitted by the aligned dust becomes polarized. Think of polarizing sunglasses as our aligned dust grains.





We can detect and examine polarized light by using a polarizer. If you want to see if your sunglasses are polarized simply pick up a second pair of polarized sunglasses and rotate one of the pairs by 90°. In this example POL-2 is our second pair of sunglasses to our aligned dust grains.

Right: The POL-2 instrument works in conjunction with SCUBA-2 to measure the amount and angle of the polarization of incoming microwave light.

Left: Magnetic field lines in the Orion Molecular Cloud (located in the Orion Nebula) as observed by POL-2.

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