# A little astronomy in every cell phone

Watching the clear night sky from a remote place in Southern Alberta or from high up in the Rocky Mountains is truly awe-inspiring. Stars sparkle everywhere, the Milky Way lies as a ribbon of faint light across the sky, and with a little bit of luck, the Northern Lights hover mysteriously above the horizon. People of all times and cultures have felt the beauty and the deep mystery of the night sky.

In pre-historic and ancient times, people observed with the naked eye to learn about the paths of objects in the night sky. In the meantime, technology has opened new windows into the universe. Astronomers today make observations in all parts of the electromagnetic spectrum one of which is the light visible to our eyes. Instruments are also capable of measuring x-rays, ultraviolet or infrared light, or the radio waves from an astronomical source. Astronomers have long been on the forefront of building new and better instrumentation because they try to take images of objects that are very far away and therefore very faint. Some of these innovations leave astronomy and are applied more widely. Charged Coupled Devices, for example, were developed in the late 60's and early 1970's and were first turned into super-sensitive film by astronomers who tried to get a better picture of their favorite patch in the sky. Today, this technology is all around us and makes digital cameras as common and inexpensive as they.

Many astronomers covet a special window in the electromagnetic spectrum: the far-infrared and submillimeter. This light has wavelengths just below one millimeter which is about one thousand times larger than the light we see with our eyes. So it is no surprise that visible and far-infrared light have quite different properties. Submillimeter light is particularly useful for astronomy for many reasons. First of all, very cold material in our galaxy, material that hasn't turned into a star quite yet but is slowly getting there, is giving off light at these wavelengths. That is why astronomers who are interested in how stars are born observe in the far-infrared. Also, extremely far-away galaxies give off a good deal of visible light. However, by the time the light has arrived at Earth, the continually expanding universe has dramatically "red-shifted" and stretched this visible light so that we see it now in the far-infrared. Astronomers studying such far-away and ancient galaxies have no choice but to take measurements in the far-infrared. These are just two of the many good reasons why infrared astronomy has become a hot topic in recent years.

Life for infrared astronomers is not easy though: While they hope to extract a wealth of information from far-infrared light that has traveled from particularly cold and far-away places, they usually simply don't have a chance to see this light: Water blocks the far-infrared radiation as it tries to make its way through the Earth's atmosphere. So, even if somebody gave you a far-infrared telescope for your birthday, there really isn't any point in setting it up in your backyard. The water in our atmosphere blocks all of the far-infrared light and you wouldn't see a thing. However, the information from the infrared is so incredible valuable to astronomers they leave nothing untried to catch some of that precious radiation before the Earth's atmosphere swallows it all. They fly on airplanes, launch balloons or spacecrafts. At the least they go up a tall, dry, and remote mountain. That's the reason why infrared astronomers get to travel to exotic places such as the highlands of Chile or the volcanoes of

Hawaii. On top of Mauna Kea, a dormant volcano on Hawaii, Canada has a major share in the James Clerk Maxwell Telescope. It has been one of the prime facilities in the world for infrared astronomy and is now in the process of being upgraded with a new, revolutionary camera. The technology is still under development and not quite working yet, but the plan is to have it up and running by 2006. Canada contributes two pieces of equipment to work in conjunction with this fancy new camera, one of which is built at the University of Lethbridge. This new technology may very well turn out to go beyond the limits of astronomy. Just like digital photography once was a domain for specialists rather than something that comes as part of your free new cell-phone, one day, these new detectors may turn into common household items.

**By Peter Davis for the Sun Times**

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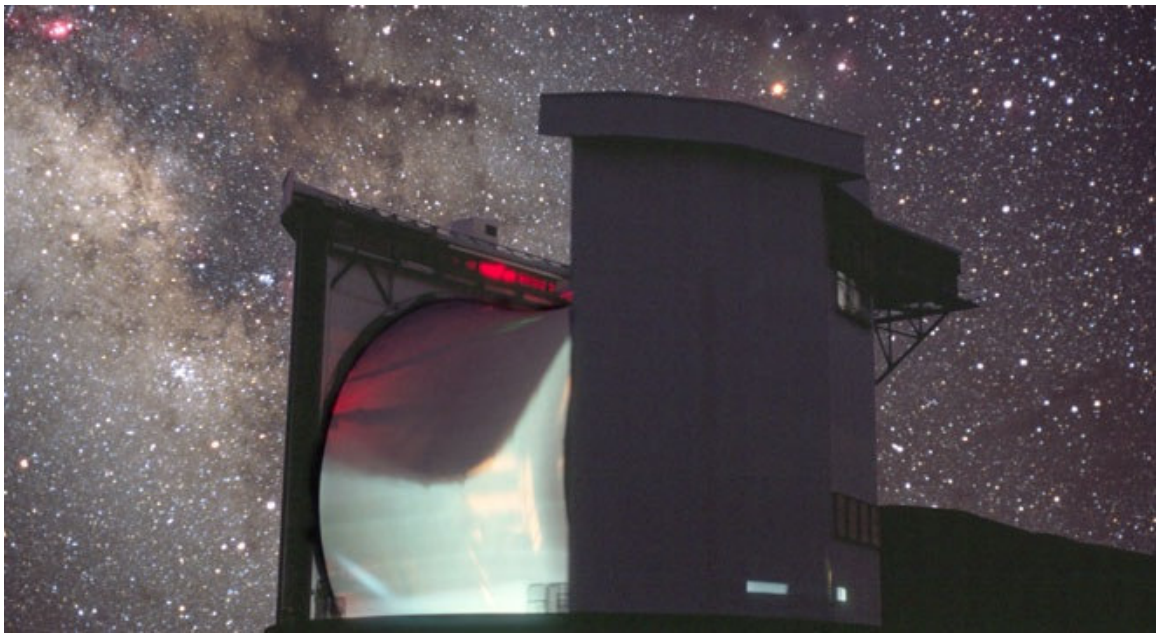

The James Clerk Maxwell Telescope is the largest astronomical telescope designed specifically to capture submillimeter light. © Joint Astronomy Centre, Hilo, Hawaii, USA