Child of space race and 'typical egghead' drawn to stars at early age

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MOST also surpasses Hubble in the amount of time it can spend viewing a particular star. The Hubble, due to the limitations of its near-equatorial orbit, can focus on a star for a maximum of six days at a time. MOST, which circles the Earth in an orbit that passes over the poles, can continuously gather data on a single star for up to 60 days at a time.

Until MOST, astronomers could only dream of such a wealth of data.

"The problem with studying stars from Earth is that you can only study [a star] at night, and only if the weather is good," said Matthews. Even on clear nights, Earth's atmosphere can distort measurements.

By focusing on a star continuously for a month at a time, MOST will allow Matthews' team to see details on the surfaces of stars that, until MOST, were no more than pinpricks of light in the sky.

The team is currently considering making a map of the surface of Kappa Ceti, a star in the constellation Cetus (the Sea Monster). Some 29.9 light years away, it has about the same size and mass as the sun but is a bit cooler, and less luminous.

Kappa Ceti wasn't on MOST's list of 31 official targets; it was one of the stars the satellite looked at during its test run phase. The data that were collected after 29 days of viewing, however, proved intriguing.

Matthews calls Kappa Ceti a "pre-teen version of the sun." Estimated to be just 750 million years old—a fraction of the sun's estimated 4.5 billion years—Kappa Ceti is "rowdier" than the sun, with plenty of flares and sunspots.

"It has a pre-pubescent case of acne," said Matthews. "There are huge spots on it."

MOST mission scientist Jaymie Matthews poses with the satellite in Toronto. *photo courtesy of* **Canadian Space Agency**

The data MOST collected suggests that Kappa Ceti is rotating much more quickly than our own Sun. Sunspots at Kappa Ceti's equator, for example, "whip around" about once every nine days. In comparison, the sun rotates about once a month at its equator.

Sunspots pass across the face of a star at different speeds, depending upon where they are located within the star's atmosphere: quicker when they're closer to its equator; slower when they're closer to one of the poles. By crunching the data, Matthews could determine how large the spots on Kappa Ceti were, and where they must be located on the star's surface.

"At first, we weren't too excited [by the data], but when we started to model it and look at the spots, we realized we... could reconstruct a map of the surface of the star... just by tracking the changes in its brightness over time," says Matthews.

He and his science team hope to put together a computer animation showing the sun and Kappa Ceti side by side, with sunspots passing across the face of each as they rotate. "It will show what a stellar eight-year-old looks like, compared to a boring, middle-aged, sedate star like the sun."

Now 45, Matthews was a child of the space race. He grew up in a Chatham, Ont. watching the Apollo moon landings and listened avidly to Radio Moscow on his shortwave radio for English-language news of the Russian space program. But it was the stars that drew him.

"Going out at night and looking up at the stars—there was just something about it that resonated with me at a very young age," said Matthews.

His parents gave him his first telescope when he was eight and Matthews used to take it out at night to the darkest hill he could find—the local cemetery.

"The police would often haul me home, and my parents would have to tell them I had permission to be out there," he said with a chuckle.

In high school, Matthews built his own telescope as a science fair project. "I was your typical junior egghead."

When Matthews began studying astronomy at the University of Toronto in the late 1970s, stellar astronomy was considered boring. The attitude among astronomers was that pretty much everything there was to know about stars was already known.

MOST will soon be proving them wrong.

Matthews can't release the details of his findings yet, but will be making two big announcements over the next couple of months.

One has to do with the satellite's first official target, the star Procyon, 11.4 light years away from Earth. MOST remained locked on Procyon for 32 days and produced some startling results, slated for release in *Nature* magazine at the end of June.

MOST was launched from the Plesetsk Cosmodrome in northern Russia on June 30 last year. Primarily a military facility, the cosmodrome was one of the world's busiest in the 1960s through '90s, with fully one-third of the world's space launches blasting off from there.

When Matthews visited it for MOST's launch, the facility was still under strict military restrictions. Matthews and the other five Canadians who helped set up the launch weren't allowed to travel more than a few blocks from their hotel, and needed a military escort for the 45-minute ride to the launch facility.

"I never imagined that, some day, I would be at what, [years ago], was a top-secret cosmodrome, working with the engineers that built the ICBM rockets," says Matthews. "The Soviets didn't even admit the existence of [Plesetsk] until 1983."

MOST was launched into space inside the nose cone of an intercontinental ballistic missile—ICBM—that had been converted for peaceful purposes. Also on board in the space that formerly held nuclear warheads were several other passengers: a Czech microsatellite designed to study drag in orbit, and a flotilla of tiny nanosats from Canada, Japan, Denmark and the U.S. that were even smaller than MOST. The Czech satellite had to be released first, into an elliptical orbit; MOST was released 91 minutes later into a circular orbit.

The launch went flawlessly, putting MOST in an orbit that sees it circle Earth every 101 minutes, passing over both of the poles at an altitude of 820 kilometres.

Matthews watched the launch

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