

# The Beauty of the Unknown



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***"When he shall die,  
Take him and cut him out in little stars,  
And he will make the face of heaven  
so fine  
That all the world will be in love with  
night  
And pay no worship to the garish sun."***

So wrote William Shakespeare, in his famous play "Romeo and Juliet".

The sky, the stars, and the universe have inspired generations of poets, writers, singers, photographers, filmmakers and many other kinds of artists. They have also moved our daily lives more than once. Do you remember when you first saw a falling star and would make a wish? Do you remember how marvellous it was to look up and dis-

cover a starry sky? Do you remember imagining how romantic it would be to watch the sky with your loved one?

Astronomy, the science of the stars, is probably one of the most ancient sciences in the world and has occupied a central role in the life and culture of many ancient civilisations the world over.

This science is at the core of many of our existential questions and for that reason it has always been central to such discussions in most civilisations, including modern civilisation. Nobody can forget Galileo, the father of observational astronomy, or more recently, the debates stemming from the opposing views of Creationists, and proponents

of the big bang theory.

"What are our origins? and 'How will our future be?' are two of the most fundamental questions that all civilisations on earth share," says Eric Achkar, President of the Astronomy Society of Geneva.

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"It is by studying celestial objects that we can discover clues to the origins of life in the universe," says Bruno Chardonnens, Supervisor of the Ependes Observatory in Switzerland.

The main components of the universe, which also constitute the various fields of astronomy, are celestial objects, solar systems, planets, galaxies and so on. Astronomy has evolved to a point that the discovery of extra-solar planets allows scientists to explore the possibility of finding life in other areas of the universe.

In astronomy, the understanding of the physics and chemistry of stars is fundamental.

"Our universe is made of stars grouped together, which then form galaxies, which form groups of galaxies. And it is around stars that numerous planets revolve, and we are discovering these one

after the other. It is by studying stars that we can understand the structure of the universe," says Mr Chardonnens.

But it is true that every discovery in the field does not always have a direct impact on our daily lives; does it really make a difference to know if the universe is retracting or expanding according to the big bang theory?

Well, besides the contribution of astronomy to agriculture and navigation and its effect on earthlings – the full moon wakes up the werewolves in us, for example – the development of new technologies has also allowed scientists to find some direct applications for astronomy. Achkar gives the example of the fusion process that produces ener-

gy in the sun: "The Sun is a star and a star is a "gas ball" which transforms hydrogen into helium thanks to the nuclear fusion process. Today, human beings try to reproduce the nuclear fusion in laboratories, seeking a clean source of energy which could, in the long term, replace nuclear plants based on fission. Therefore, in studying our universe, we can at the same time find solutions just 'above our heads' to contribute to the welfare of humanity."

But astronomy is basically "fundamental research fed by the curiosity to understand nature. It is not an applied science," emphasises Prof. Dr. Daniel Schaerer of the Geneva Observatory, who first studied physics to understand the world around him, a field that fur-

ther led him to study astronomy. Now, he is a specialist in starburst galaxies and lectures at the University of Geneva. "All natural phenomena are ruled by physics, and astronomy contains all the fields of physics," he adds.

Nowadays, astrophysicists usually come from the field of physics, and then specialise in astronomy, which is, itself, divided into several fields of research such as planetology, including extra-solar planets, stellar physics, solar physics and cosmic physics.

Chardonens, who got his first telescope at the age of 16, adds that you "need to be very Cartesian to study the sky...you need to be very precise. It is very technical."

But astronomy seems to be the science that awakens the dreamer in us.

Achkar was 10 years old when he first experienced astronomy with a 6" telescope. "It was amazing. I saw unexpected details of the moon and Jupiter," he recalls. Since then, he has remained fascinated by the sky. "There are so many more things to see in the sky than we could figure out," says the man who became the President of the Astronomy Society of Geneva to share its passion with the public.

And when we ask him about a particularly notable memory of observation, it sounds quite poetic: "A bright shooting star in a very dark night when it was new moon. The wind which blows in the trees from time to time, no other noise...The intense quietness of nature with all this spectacle above our heads..."

Chardonens thinks that the simplicity of looking at the sky, the moon or falling stars makes the imagination travel and helps people to forget real life problems. He also tells us that "the fact of showing people planets through

a telescope and saying that Saturn is located 1.5 billion kilometres away fascinates the public without explaining any big theory...It is the sciences of infinity that make people dream." It's true; we are human after all and somehow fascinated by the mysteries around us.

Today, there are about 15,000 astrophysicists on earth, who dedicate their time to exploring outer space, pushing every day against the limits of the unknown.

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But astrophysicists are not all you need. In fact, to profoundly study the sky, you need an entire team of technicians, engineers, astronauts and mathematicians, who help to build up technologies and projects to improve observation and data collection.

Moreover, in astronomy, it is not really possible to conduct experiments. It is necessary to observe, and to make deductions from these observations. All the deduction work is based on theories rooted in physics, and the precision in mapping and understanding the universe depends on the sophistication of the technology used.

Today, scientists can use optical telescopes, radio telescopes and satellites, so that observations can be conducted at almost any time of the day and year.

"It depends on what you want to see. The sky is different between the Southern and the Northern hemisphere. It depends on the season," says Schaerer, who is really excited about the launch of the Swiss satellite Cheops and the Alma telescope in Chile. Both projects will bring more information to the community of researchers.

Observations are divided into night time and daytime. During a daytime observation, you can watch the sun, preferably in a clear sky. At night, you can observe most of the celestial objects: planets, stars, nebulae, galaxies, globular clusters and the moon.

"It's better to watch the moon while it is half lit by the sun, thus not full. The advantage of seeing it half lit is that many craters can be observed; that is not the case when the moon is full. To see the moon half lit, you need to use a calendar to see exactly when the moon will be half full" says Eric Achkar.

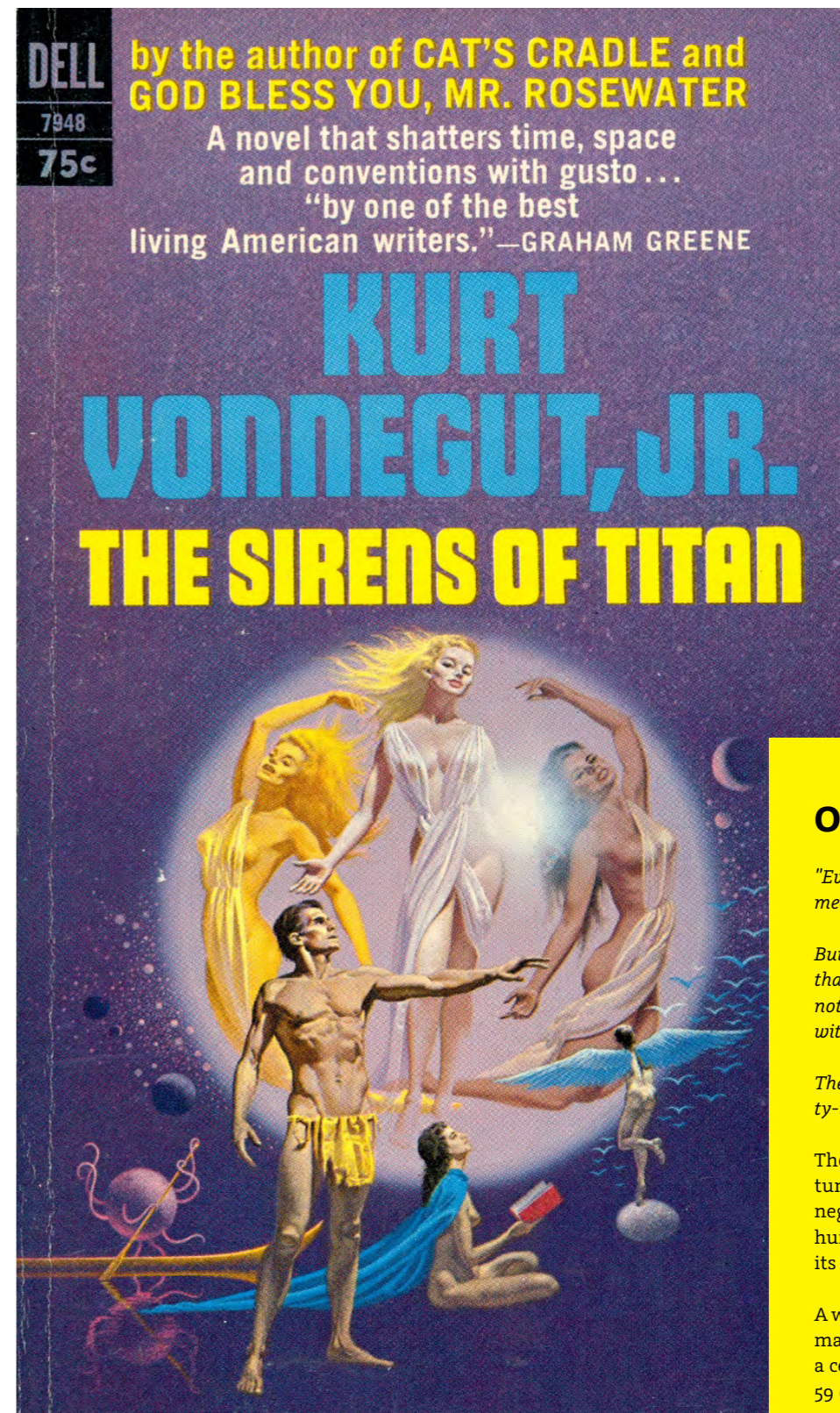
Winter is a good time for observations because the nights fall earlier and the sky is clearer. "For me, September is interesting. The Milky Way is also very visible during this period. January is good too, but it is colder", says Chardonens, who organises visits in the Ependes observatory.

Fortunately for our readers, a lot of interesting astronomical events will be taking place next year. On March 20, there will be a partial solar eclipse, up to 70 percent, and in the Faroe Islands and in Spitzbergen, Norway, it will be a total eclipse. This is the first solar eclipse since 1999. To learn more about the eclipse's location and time, you can check NASA's website.

Thus, let's raise our heads upwards to dive into the sky, and contemplate the beauty of the unknown.

V. E.

[www.observatoire-naef.ch/fr/home/eclipse.gsfc.nasa.gov/eclipse.html](http://www.observatoire-naef.ch/fr/home/eclipse.gsfc.nasa.gov/eclipse.html)



## OUR READ

*"Everyone now knows how to find the meaning of life within himself."*

*But mankind wasn't always so lucky. Less than a century ago men and women did not have easy access to the puzzle boxes within them.*

*They could not name even one of the fifty-three portals to the soul."*

Though he is no longer with us, we fortunately still have access to Kurt Vonnegut's delightful brand of cynicism - humorous and light yet ponderous in its relevance.

A wealthy playboy is made an offer by a man that materialises, with his dog, at a certain time, at a certain place, every 59 days.

Published over half a century ago, this novel is no less pertinent or entertaining today than it was then. Vonnegut takes us through space and time, weaving a telling tale; one that questions the meaning of, well, everything.