

INTERVIEW WITH Daniel Schaerer

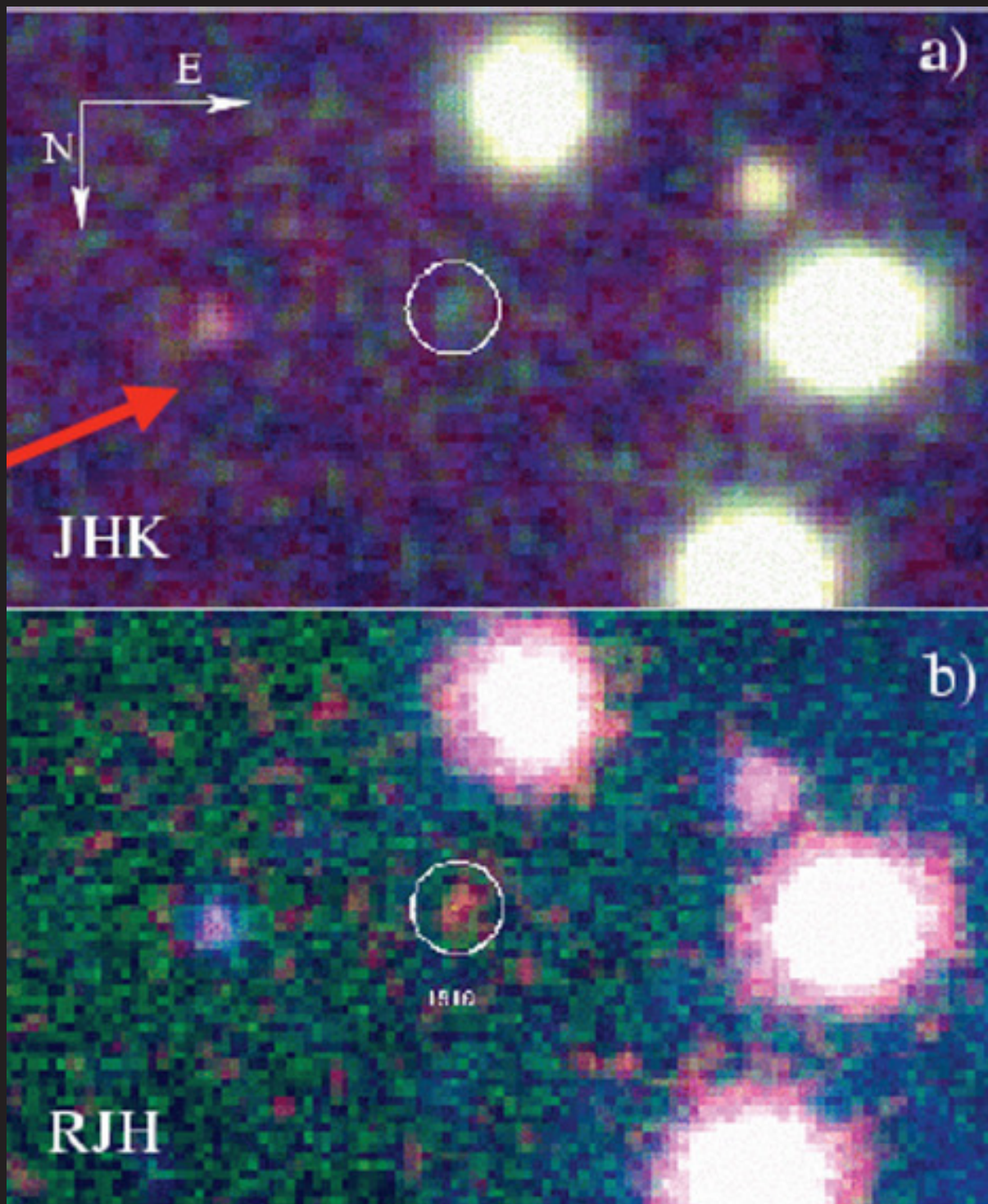


MARKING THE ROUTE

<<We want to know how the first stars influenced the birth of succeeding generations of stars>>

By GARA MORA, of the IAC Director's Support Team

The life of a star is a tale that tells of its struggle against the force of gravity, from the moment it begins to contract into a star, igniting the nuclear reactions in its interior, until it either overcomes or succumbs to gravity. The end of the tale is determined by the initial mass of the star. High mass stars live brief lives, dying young and losing part of their mass along the way. Apart from studying the formation and evolution of these immense celestial bodies, Daniel Schaerer, of the University of Geneva, Switzerland, and lecturer at the XVIII Winter School of the Instituto de Astrofísica de Canarias (IAC), devotes his time to unveiling their role in the formation and evolution of primitive galaxies, those objects that provide our Universe with the raw materials that now form us.



First spectroscopic confirmation of a possible redshift (z) = 10 lensed source (Abell 1835-IR1916).

What is a massive star?

Massive stars are much heavier than the Sun. They can be up to 10 or 100 times more massive. They stand out because of their high luminosity. These stars can become a million times brighter than the Sun. Their masses can be measured dynamically, in the same way as planetary masses are measured. The most massive ones are 100 to 150 times heavier than the Sun.

The most massive stars evolve more rapidly than those of low mass. Does this in any way affect the galaxies in which they are found?

Indeed it does. Massive stars have very short lifetimes, at least on astronomical timescales; they live for only a few million years, explode quickly and expell a large quantity of matter into their surroundings. This, along with the light they emit, has a profound impact on the interstellar medium of the host galaxy. They can create galactic winds and propel matter out of the galaxy. They can also be seen to very large distances. They are certainly very special objects.

Are these stars found in all kinds of galaxies?

They can in principle be seen in any galaxy, but above all in galaxies with active star formation; in other words those in which stars are forming now. This occurs because in old galaxies, such as ellipticals, all the stars of this type that might once have existed have by now all disappeared, since they have very short lifetimes and explode spectacularly, and the signs they leave behind can't be seen in old galaxies.

What makes the study of primitive galaxies so interesting?

We want to see how star formation began in the Universe and how the small galaxies that formed in this epoch merged with others to form bigger galaxies. We are interested in investigating the Universe to its limits, in knowing what the

first stars were like, how they later influenced their surroundings and hence the birth of later generations of stars.

What do emission lines tell us about primitive galaxies?

They can tell us about the the age of the galaxy, the number of stars that are forming inside it, their chemical composition and temperature. These are the most direct and interesting indicators.

Can science provide clues to help us understand what there was before the Big Bang?

I'm not a specialist in exotic theories, but in general the present theory doesn't allow us to say anything about what happened before the Big Bang, neither does it tell us why the Big Bang occurred in the first place. What we can describe is how the Universe evolved, how objects inside it were

formed, but the why and before of the Big Bang are inaccessible to present-day physics because they are not observable.

What is your opinion about the popularization of astrophysics?

I believe that astronomers have sufficient contact with the public. Tenerife is an excellent example; there are many public talks, in schools, etc. I think it's interesting that the public should open its eyes, look at nature and try to see, with the help of astronomy if we wish to, the scientific way to proceed in trying to understand nature, what is happening around us. It's also a question of curiosity. In my opinion it's interesting and useful, and encourages people to discover the world from the point of view of physics and astronomy.



Photos of Daniel Schaerer: Miguel Briganti (SMM/IAC)