'Exploring the Universe Is An Entirely Natural Thing'

An Interview with Dr. Alan Harris

Dr. Alan Harris, a British astrophysicist, is director of the NEOShield Project at the German Aerospace Center (DLR). NEOShield is an international research program led by DLR for researching "Near Space Objects" and how to defend against them. On Feb. 15, 2012, Toni Kästner of the Civil Rights Solidarity Movement (BüSo) in Germany interviewed him for the BüSo website (http://bueso.de/node/5572). The interview was conducted in German and translated by Daniel Platt.

DLR

Dr. Alan Harris: "For me, our environment is not only the environment that we see in the countryside and the air and the water; our environment is the universe."

Kästner: I first heard about Project NEOShield around Jan. 20. Could you say a few words about what this program is, what its mission is, and what your responsibilities are within this program?

Harris: NEOShield is a research program within the so-called FP-7 of the European Commission. A few years ago, the European Commission put out a call for ideas on how best to deflect threatening "NEO" asteroids or comets: how to protect the Earth from impact.

I have personally been doing research for years on asteroids, comets, and the so-called small bodies of the Solar System. The call for proposals appealed to me, so I discussed it with my colleagues, and we decided to submit a proposal, along with five other groups in Europe. We were selected, and were awarded the contract. Now we have the work, and naturally, the responsibility goes with it.

The consortium includes 13 partners from six countries. Although we receive funding from the European Commission, it is not only EU nations that are participating, but also an American institute that is part of the SETI Institute in California, and TsNIIMash, an organization that is part of the Russian space agency Roscosmos. Therefore, we also have some influence of our own in this subject area.

We are working toward a space mission to test meth-

ods of defense against Near Earth Objects. We won't be able to do this with the money we are currently receiving from the EU, because space missions are very expensive—I'm talking about several hundred million euros—but we want to be able to say at the end of the day, that the next step in the defense of the planet would be a space mission of this sort. We will make some precise proposals for detailed missions that could be started in order to test methods of defense against threatening near-Earth asteroids.

In 1908, an object about 30-50 meters in diameter crashed near the Podkamennaya Tunguska River in Siberia, creating an explosion that destroyed over 80 million trees.

The Threat of Small Celestial Bodies

Kästner: I have read that car-sized objects show up once a year, football field-sized objects every 2,000 years, and really big hunks of rock every million years—at least according to the statistics. Could you tell us, in order to avoid preconceptions introduced by these statistics, how important it is to prepare ourselves in time to defend the Earth from a danger like this?

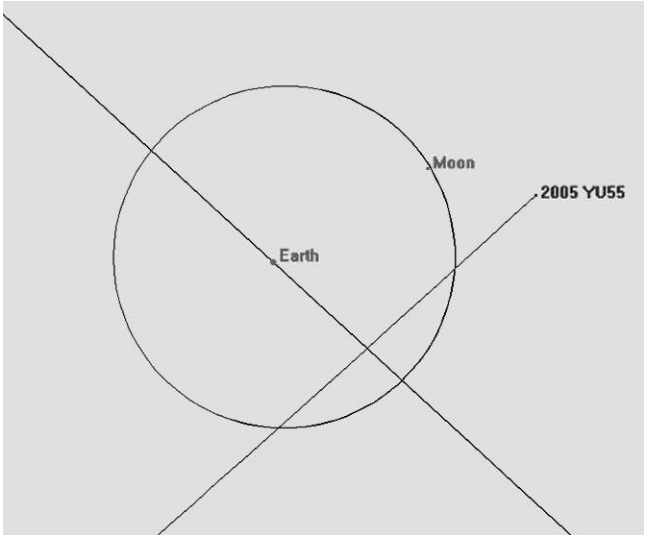
Harris: The average person thinks mostly just about his own life, his house, his car, his family—in other words, "Could I as an individual be affected?" I must admit that the chances are very, very slim—approximately one in a million—that a given individual on this planet could lose his life in an asteroid collision.

The problem here is that we're talking about more than one person; we're talking about our civilization. In the last few hundred years, the Earth has become much more densely populated. We have an insanely complicated, networked infrastructure with the Internet and all that goes with it, and if any part of this infrastructure were to go kaput, whole domains of human life would have big problems, which could really lead to a breakdown of the normal functioning of our society.

I'm talking about the possibility, for example, of a major city suddenly disappearing. That would only take an asteroid of 30 to 50 meters in diameter. We experienced an example in 1908, when an object about this size came down in Siberia. It didn't reach the ground, but exploded in the air 5-10 km high and totally destroyed an area of 2,000 square kilometers. Eighty million trees were knocked down by this explosion. One can only begin to imagine what it would be like if this were to happen over a city like Berlin or London or Paris or Los Angeles. There wouldn't be very much left. We know how many million people can live in such a compact area. Millions of people live in a concentrated area like a city, and it could be annihilated in an instant. Thank God we have never yet had any concrete experience with an event like that, because such a thing has not happened in recent memory, except in Siberia, where almost no one was living at the time.

We know the discovery statistics for Near-Earth Objects; we can also count the craters on the Moon, because the Moon is exposed to the same stream of Near-Earth Objects. Through such studies and information sources we can make a very good estimate of the frequency with which such objects strike the Earth. We know that an object with a diameter of 30-50 meters could strike the Earth at any time without warning, because these objects are so small that they are not always detected by the search programs. To be sure, we now have some very good search programs, which scan the skies every night for NEOs; yet we find relatively few of the smaller objects. We have already found 95% of the relatively large objects, with a diameter of 1 km or more. We will have no problem with such objects in the next hundred years. There is no object that we have found, which could be a threat to the Earth within that time-frame; but smaller objects could strike at any time. Within the interval of some hundreds of years, we expect that something like that will happen somewhere on Earth. It is only a matter of time. The fact that nothing more has happened since 1908 doesn't mean a thing. It could happen again tomorrow.

FIGURE 1
Asteroid YU55 Passed Between the Moon's Orbit and the Earth in 2005



NASA

Too Much Bureaucracy, Too Little Money

Kästner: Other countries have also responded. In Russia and Belarus, two programs have been initiated in the past two years—the Strategic Defense of the Earth and IGMASS—with which they want to study asteroids, with an intention similar to yours: to find out how many of these there are. What kind of software does one need in order to see them? But one wants to go beyond that and start a renaissance of space travel, in order to understand many other phenomena: What is going on with the Sun, the climate, with earthquakes, with asteroids, with the cosmic weather—Saturn has been having giant storms.

To what extent can you imagine international cooperation with such programs as the SDE, IGMASS, or entirely new programs, or to what extent is this already perhaps occurring?

Harris: Such initiatives are of course excellent. We always need new ideas—nowadays that is very important. With today's technology, it is also relatively simple to collaborate with groups in other countries. As I said, we're doing this in NEOShield with Russia and America and a number of European countries. I think that that should be done.

It's a question of funding. My experience, with our proposal to the European Commission, is that it takes a great deal of work. Just writing a proposal took me at least a year. I was fortunate that the work was not in vain. The funding of science has become very bureaucratic, and my scientists work too much on things that don't directly serve science. In my opinion this has gone over the top. We need to reduce the bureaucratic administration, not only in institutes such as this one, but generally in the universities, and abroad as well. I've had experience in other countries as well, so I would say that in Germany, things are going relatively well, but there is still a ton of bureaucracy. Hopefully there are other ways, but money is tight, and the tighter the money becomes, the more bureaucracy we get.

Our Environment Is the Universe

Kästner: This makes me wonder what significance society attributes to activities like space flight, or anything that happens outside the Earth. Today, it can't be much. How do you assess the significance of space for mankind today, and what should the significance of space actually be?

Harris: When one considers the Earth, it is very much dependent upon whether one is standing upon it, or looking back at the Earth from the outside, from somewhere on another planet. Or perhaps one is seeing our Solar System or our Sun from another star, or looking at our galaxy from another galaxy. For me, our environment is not only the environment that we see in the countryside and the air and the water; our environment is the universe.

We have had the good fortune so far on this Earth, as seen from space, that our environment has been relatively friendly, that is to say, mankind has had time to develop. We have had enough time for evolution, which today has led up to humans; but the question is, how long it will continue that way. We have misgivings, because we have mostly not experienced any great catastrophes during our lifetime. Most people don't know what a great catastrophe is.

I think in terms of an infinite future for mankind. I think that mankind ought to continue to exist, that it will develop. In a thousand years, the world will look entirely different, but I hope that in a thousand years, ten thousand years, a hundred thousand years, there will still be intelligent life on Earth. Perhaps more than today. Sometime during this span of time, though, something will happen. It could come from space as well. The catastrophes that could come from space are much greater than those that we have experienced on Earth. Therefore, if we really want to survive over the long term on Earth, we must begin to deal with these phenomena.

U.S. Geological Survey/D. Roddy

The Barringer meteor crater in Arizona was created by a piece of an asteroid crashing to Earth 50,000 years ago. The crater is one mile in diameter. No humans are known to have lived there at the time.

There is a series of relevant issues: Our Sun is not as stable as we might wish it to be; we all know that the solar wind with its charged particles can also lead to problems on Earth. Radiation and interaction with the magnetic field could lead to problems with the electrical power grid and communications networks, with satellites, etc. In the long run, there may also be entirely different phenomena, such as supernovae, although one must say that this is highly unlikely. But the problem with asteroids and comets is already very real and could also lead to great catastrophes in a timespan of hundreds or thousands of years.

Consequently, I also think about this problem, because it actually led to the evolution of humans; impacts on the Earth made it possible for *us* to be able to walk the Earth today—rather than still the dinosaurs. But now that we are here, we have to deal with the same natural phenomena, which will continue. The fact that we are here doesn't mean that the danger stops now. If we want to survive over the long term, we must understand such phenomena and be able to defend ourselves.

Kästner: We recently posted a study to our website on the question of the defense of Earth. It is increasingly apparent that we are going through cyclical processes that have to do with the motion of our Solar System through the galaxy, and perhaps even beyond. We can also discern various relationships among the galaxies. At the same time, there is a fundamental progressive development that naturally poses certain questions to mankind today. Astronomically, we find ourselves at the same point that the dinosaurs were, 62 million years ago, which is why we have to say that progress is the best defense. We should not be investing a mere EU6 million in the defense of Earth, while pumping EU750 billion into the banking sector; we should immediately begin to reorganize the financial system, rebuild a rational economy, and make scientific breakthroughs. Therefore, my question: Which breakthroughs do you think we need, in order to actually make this step forward?

Harris: It would be lovely if we could do that. But I think that it can hardly happen with the present-day world political structure. We would need some sort of revolution, hopefully a peaceful revolution, before our civilization would think that way. A nation can have such visions, like the Americans did with the Moon program. An example of the next step would be for us to launch a manned mission to Mars.

I also see how the ESA's [European Space Agency] Mars research and cooperation with the Americans is going—or rather, how it is not going. A project was initially contracted with the Americans, but I heard yesterday that it will apparently cease. So then we look to Russia. Could we possibly do the whole thing with Russia? There is no international structure to administer such a project.

We definitely need the European Space Agency, which does fantastic things for Europe and space research, and which has significantly advanced space activities in Europe. We need this for the whole world. We must bring together all space-faring nations, such as China, India, and Brazil, with Europe, the United States, and Russia, and also with other nations that would like to participate.

There Is Still So Much To Explore

There is still so much more that we could do in our Solar System. We even could go much further outside it, for the farther we go, the more we learn about the origin of the Solar System—for example, in the direction of Pluto or the Kuiper Belt. There are asteroid-like

Creative Commons/Rogelio Bernal Andreo (Deep Sky Colors)

Dr. Harris comments: "For me, it is entirely natural for us to want to leave the Earth, so that we might explore our environment in space. I think that the absolutely most important thing is for humanity to go out and look at what is out there." Shown here is a digitally "stitched" and color-enhanced composite image of an area in the constellation Orion, taken over several nights.

objects out there, comet-like objects, that have remained unchanged since the beginning of the Solar System. The farther we go, the more we learn. We could still do many more explorations of the big planets, which is done with unmanned robotic missions.

It's my view that we are just at the beginning. We could do so much more, and that doesn't cost much, compared with saving Greece. I admit that the latter would be far more important. It is frightful how Greece is being dealt with at the moment, also to save the banks. Our economy apparently only survives if banks make big profits, and they've always got to have billions at their disposal. Otherwise, it doesn't function. I'm no economics expert, no economist. But I know that with just a fraction of this capital—we're just talking about hundreds of millions, not billions—we could send space missions to Jupiter, Saturn, or even Pluto.

At first we thought of asteroids as uninteresting hunks of rock, and that once you had explored one asteroid, you'd know everything there is to know about asteroids. Now that we have explored a few of them, we know that that is absolutely not the case. Asteroids are also like different worlds. Of course they have no atmospheres, but there were always surprises whenever we examined an asteroid up close.

Our Solar System is more colorful, more interesting, more multifaceted, and has much more to offer than the layman imagines. In my opinion, we could start a lot with just a bit more money—it doesn't have to be much. But above all, we scientists shouldn't have to spend half our time begging. Writing a proposal is like begging. You go to an investor and say, "I think I have a good idea—I need money." It is important that the money flow a bit more freely, and that science enjoy a higher priority in society.

We are now finding planets around other stars. Planet formation is taking place wherever there are stars. Naturally there is also the possibility that there is intelligent life on other planets—perhaps not too far from us at all! We don't know, but it is entirely possible. We have here, before our eyes, a Solar System with planets, and we presume that these planets came into existence exactly like the planets around other stars. We could learn more about such exo-planetary systems, if we examine our own Solar System carefully and do more research. That leads us to an understanding of how and where there could be life elsewhere, and, in my view, the discovery of life on other planets would be the greatest revolution in human philosophy that has ever occurred. Perhaps there are indeed other intelli-

gent beings, and we could then begin to talk politics, economics, and religion with them! That would be my dream, to speak with beings who live on other planets and have an entirely different history than mankind.

I am a passionate astronomer and space researcher; that has shaped my entire life. Already in childhood I was interested in astronomy. For me, it is entirely natural for us to want to leave the Earth, so that we might explore our environment in space. I think that the absolutely most important thing is for humanity to go out and look at what is out there.

I often think, when we look outside with our telescopes at the stars and galaxies, and when we try to understand why there are planets and how they came to be, and what that has to do with life, then I think of a child, who for the first time finds his way out of his crib, begins to crawl around, and finds his way into a library. He looks around and finds order, sees fantastically beautiful things, but understands nothing whatsoever, although he sees that it is important. Perhaps later, he will understand what it is. Similarly, we don't understand anything right now, but we are looking around and thinking that here is something we must begin to investigate, so that one day we will be able to understand.

I believe that mankind right now is more or less at this point, with respect to the universe. We understand really very, very little. There is so much out there to discover! Perhaps there are other universes. All sorts of things are possible. When one looks at quantum mechanics, one likewise sees little universes. One sees how the world in the very, very small is just as difficult to understand as the world in the very, very large. We are somewhere in the middle. I think it will happen. Regardless of how much nonsense we are creating in the world now, someday we will do it. If not we, then another life in our universe.

Either we are here alone, or we are not alone. Whichever is true, whichever of these possibilities is a fact, it's a crazy thought either way. If we are alone in this universe, then we could really play God. Perhaps we even have the responsibility to play God, if we are alone. If we were no longer around, then nothing would be here at all, and nothing would make any sense. Therefore, we have such a great responsibility to make the best of it.

If we are not alone, then we also have a responsibility to survive until we have made contact with the other beings. One way or the other, we must strive for this.