A Conversation with Ben Bova

By Tim Ventura, August 1st, 2003

I imagine that one of the advantages of being a science-fiction writer is the ability to look at the future in a manner unencumbered by the short-term engineering difficulties that tend to bog down the mind with the minutiae of problem solving. A good example of this comes in the form of a Nitrogen Laser that I'm currently building -- the device produces a beam using only air as the lasing medium through which a high-voltage current pulse is passed. The idea is truly elegant, and worthy of mention in fiction despite the fact that it exists in reality.

I set out to construct a version of this laser last week, with the aid of several excellent pages of on the Internet by enthusiast Mark Csele. Unlike the design that he promotes, which features a rail-system embedded between two metal plates, the design that I wanted to use would have an external laser head -- a truly beautiful design with an external capacitor array to provide the 1 nanosecond pulse of energy required to initiate lasing.

As it turns out, the only problem with this idea is that the rail-system must be embedded within the rail system in order to allow the high-voltage pulse to traverse the air-gap between the rails in the required 1 nanosecond lasing time. Despite the beautiful, elegant design that I had constructed, reality had interceded with the hard-truth of the device: an embedded rail system is ugly and unwieldy, but required.

Science-fiction doesn't have to solve problems like these. Assumptions can be made by the author about the state of technology when the fiction is to take place, and from that the challenges of that era can be solved to provide the requisite technological sophistication to allow the characters in the story to have the high-tech tools that they need for the story to take place.

When I was a kid I read "Orion", by Ben Bova. In that classic piece of science-fiction, the protagonist is portrayed as somewhat of a human "machine" -- a tool of the gods sent through time to combat their enemies. At the time I'd read it, the idea seemed outlandish -- after all, who could design a human being? Nearly 20 years later, with genetic engineering now commonplace for plants and lower life-forms, and the ability to engineer a person is becoming much more realistic with every passing day.

The case above is one of many examples of what is initially portrayed as being 'science-fiction' slowly creeping into being 'science-fact'. The most celebrated case of this is Arthur C. Clarke's description of the communications satellite in the journal “Wireless World” in, and later led to Clarke being credited as the inventor of the device.

My research into Lifter and Antigravity technology has also suffered to some degree from short-term problem-solving. While I've been able to make great progress into improving the efficiency of the technology, perhaps I've focused too much on the smaller day-to-day details of making things work, and not enough on the long-term goals of taking the technology to the next level.

I thought that it might be nice to speak with a professional about some of this -- someone with vision, with experience, and most importantly, with a background in the scientific theory to give them the ability to think critically about the ideas that we're considering with regard to Antigravity and Field-Effect Propulsion Technology. I'd just finished

reading Ben Bova's novel "Orion Among the Stars" -- a follow up to the Orion saga -- and thought that perhaps he might be the person to speak with.

Ben Bova has authored many novels over the years, and his latest collection -- the “Grand Tour” science-fiction series -- is intended 'to show how the human race can expand through the solar system'. These are a collection of science-fiction novels intended to show the near-term ability of mankind to colonize the solar system, as well as the type of people that will be involved with this, their goals, and motivations.

As a demonstration of the predictive abilities of science-fiction, Ben Bova's website maintains a list of his predictions that include the following ideas: "Life on Mars, The Space Race of the 1960s, Solar Power Satellites, Organic chemicals in interstellar space, Virtual Reality, (VR)Strategic Defense Initiative (Star Wars), International Peacekeeping forces, Ice deposits on the Moon, and Electronic Book Publishing". This was even better than I had expected, so I hastily sent Bova an email requesting an interview to find out more about his thoughts on the future of space-travel and Antigravity/Field-Effect Propulsion technology.

The next morning, after guzzling two cups of iced-coffee and logging into my email system, I found that renowned science-fiction writer Ben Bova had replied to my email regarding the interview request. In all honesty I felt a bit nervous about speaking with him about this. While my research has been important to myself and has inspired interest in the younger IT-generation of enthusiasts, I wasn't sure that someone with his experience would find it as exciting as I did. After all, he was writing novels before I was born, and bringing my ideas to someone like that could backfire on me in a big way. Nonetheless, he'd provided a phone number and a good time to call, so my excuses rapidly began to fade as I tried to hurriedly brainstorm some questions to ask him.

I called Ben at his office and immediately began to feel a bit guilty. He told me that he'd just returned from a 4-week trip, which made me realize that he hadn't even had time to settle in before I called. However, he was interested in talking about the new technologies and offering advice, so I couldn't resist the opportunity to begin telling him about the Lifter technology and other projects that I've been investing time in lately.

I asked him if perhaps science-fiction was in some ways responsible for the lack of vision in the scientific community with regard to Antigravity and Field-Effect Propulsion. I pointed out that science-fiction writers have tended to focus on methods of Interstellar-travel more than methods of simply getting into orbit, and that over the years perhaps this has shaped the opinion of the children reading this that eventually grew up to be scientists and engineers themselves.

Bova responded by pointing out that methods to get into orbit haven't been neglected so much as simply being inherently difficult and inefficient. Sure, writers like H.G Wells have come up with plot devices such as the material "Cavorite" to allow the story to easily progress from being Earth-bound to being space-adventures, but in realistic terms its difficult to envision methods of getting into orbit that are more realistic than this for storytelling purposes.

Orbital Delivery Methods

Bova stated, "As Robert Heinlein said, 'if you can reach low orbit, you're halfway to anywhere'. Chemical rockets have inherent limitations, and nobody wants to use nuclear propulsion in the atmosphere. I think that the best way to achieve orbit is possibly a skyhook. A skyhook would reduce the cost of lifting things into orbit to pennies per pound . If you make fibers for the tethers from buckeyballs (something that's already been done in a laboratory setting), it would probably provide a workable strength to weight ratio."

It's interesting that he would mention the skyhook -- another name for a space-elevator. I asked him if he'd heard about the work being done by Michael Laine's team over at Liftport (formerly HighLift Systems), and he indicated that he hadn't heard about their startup efforts. I'd talked to Laine just the other day about their recent designs, which involve using a ribbon-shaped tether to connect a station on the ground to an orbital station for highly-efficient transport of materials into space. I agreed to pass along some info about Liftport to him, and asked then about other methods of getting into orbit that might come to mind.

Bova responded by describing a two-stage orbital system under construction for the X-Prize competition by aviation-pioneer Burt Rutan. Rutan is an aviation expert who has designed a number of aircraft using advanced composite materials that have opened up a new world of lightweight experimental aircraft to enthusiasts. "Burt Rutan is currently building Spaceship 1 -- This is a two stage device that is lofted on a plane and uses chemical rockets to reach orbit. If anybody can do it, Rutan can..." If Rutan's idea works -- and Bova seems to believe that it will -- then it could save on the cost of chemical boosters because it doesn't require propulsion all the way from the Earth's surface to orbit, but instead from an aircraft-based launch platform already traveling at a considerable altitude.

Rotating Superconductors

I thought that it might be pertinent to ask Bova about some of the ideas that are further out in terms of near-term practicality. Ideas like this include the experiments involving super conductive gravitational shielding by Russian scientist Eugene Podkletnov -- they may indicate an entirely new vision of aspects of physics theory, which takes time and makes them more difficult to engineer with conventional technologies. In his opinion, I wanted to know what he thought about not only rotating superconductors, but also the entire concept of rotating magnetic fields and centrifugal devices playing a role in manipulating gravitational-force.

"Rotating bodies often provide illusory results -- they seem to provide lift but often don't. An example is the Dean Drive from the 1960's. People have been experimenting with these for years, but haven't been able to break Newton's Law with rotating devices." The Dean Drive is a device that attempts to translate a rotational motion into linear acceleration. The idea is to produce thrust without losing mass, which is usually ejected as exhaust from the combustion of a propellant.

The idea behind the Dean Drive, a device constructed in the 1950's by inventor Howard Dean, is similar to the Woodward device, and is usually justified as relying on Mach's Principle. This states that the tendency of an object to resist acceleration is based on the

sum of all gravitational attraction in the universe. Woodward, a member of the faculty of Cal State Fullerton University in both the physics and history departments, believes that this is a loophole to Newton's Law that allows a rotational or vibratory device to translate its energy into linear acceleration without having to lose mass -- ie: exhaust -- in the process.

The Dean Drive is considerably different than Lifter technology is -- unlike devices based on Mach's principle, the Lifters are based on a combination of Ion-Wind and Biefeld-Brown technology. Even conventional scientists have conceded that these devices work (at least in the atmosphere), but the chief complaint against commercial viability has been the traditionally low efficiency of the devices.

I described to Bova in brief that the Ion-Wind was what the established community felt was the primary source of thrust for Lifter technology, but that experimenters like Jean-Louis Naudin in France were conducting interesting experiments with completely sealed devices that seemed to indicate that the Biefeld-Brown effect was something that couldn't yet be written off. While researchers like Jonathan Campbell became more and more convinced from vacuum-chamber experiments that these devices didn't work in a vacuum -- hence negating the Biefeld-Brown Effect theory -- experimenters like Naudin proceeded to continually to perform tests with sealed devices and unique vacuum-apparatus that appears to indicate exactly the opposite.

"Many different experiments will jiggle and shake but extraordinary results are required to prove that they really work. Lifters will need to lift at least a few pounds at least a few feet into the air. The Lifter's efficiency in doing this isn't terribly important because you can remotely power the device. That's what we were doing in the 1960's with Laser Propulsion -- boiling off a propellant such as Hydrogen using a remotely positioned megawatt laser. In that manner you can reduce the weight of your propellant to only 50% of the overall weight of the vehicle."

I mentioned to Ben the newer idea using Lasers to rework the concept of the Orion ship, from the science-fiction classic "Footfall". Bova replied that while he was the editor of Analog science-fiction magazine that he'd actually requested that Jerry Pournelle write about that idea in a story, which eventually resulted in Jerry Pournelle & Larry Niven's 1986 classic novel "Footfall", in which elephant-like space invaders are ultimately destroyed by an Orion-ship launched from the harbor of the writer's hometown -- Bellingham, WA.

Pournelle didn't invent the idea of the Orion-ship -- that honor goes to scientist Freeman Dyson, whom postulated that this might be a way to loft enormously large payloads into orbit. In fact, during the 1950's experiments had even been conducted with scale-models of this technology using conventional explosives, but the project had ultimately been terminated because of environmental concerns and related political issues. The original idea of the Orion-ship in Footfall had relied on a series of small nuclear-detonations to reach orbit, which became a more and more unfashionable technological approach over the decades as the public learned about the dangers of posed by nuclear fallout.

A much newer variation on the concept of the Orion-ship technology is being conducted by the Lightcraft technologies, Inc, and utilizes a megawatt laser projected either from orbit or the ground to create a sustained atmospheric detonation under a spacecraft. This should provide enough thrust to accelerate the craft into orbit or beyond. Lightcraft has already conducted a technology test that has accelerated a 4.8 inch diameter scale-model to an altitude of 233 feet in a November 2000 test at White Sands missile range.

All in all, the interview was a success, at least in that I was able to discuss a variety of different concepts with Bova pertaining to not only AG and Field-Effect Propulsion technology, but also with applications to conventional near-term orbital propulsion concepts. It's good to keep in mind that ideas like the Lightship and the Space-Elevator may be just now starting to be taken seriously in the mainstream scientific community, but they originated in the hearts and minds of science-fiction writers decades ago.

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