# ULA and Ball Student Interns Launch Their Future in Spectacular Fashion

*By Greg Arend and Chris Chavez*

United Launch Alliance (ULA), and the heritage companies from which it formed, have been launching Atlas and Delta launch vehicles for decades. Over the years, the evolution of these product lines have resulted in larger—more powerful—and more reliable rockets that launch our nation's most valuable space assets for the National Reconnaissance Office, Air Force and NASA.

In 2008, ULA expanded its launch vehicle product line, which includes a number of Atlas and Delta rocket variants in the neighborhood of 200 feet tall, to include its newest and smallest rocket, the "2008 Future." Each summer, ULA hires dozens of intern students from colleges and universities form across the nation to work on its Atlas and Delta launch vehicle programs. During the day, they work in a job that is related to the degree they are pursuing, - mostly engineering. But as an after-hours, extra-curricular activity, they are invited to join the ULA Intern Rocket Project. The ULA Intern Rocket Project allows interns to get hands-on experience by building high power sport rockets from scratch during their 10-week summer internship. Ultimately, they actually get to launch the rockets at the end of the summer!

## ULA Intern Rocket Project History – The First Three Years

In the summer of 2008 (the first year of the project), ULA intern students built ULA's newest and smallest rocket. Dubbed the "Future," the students built a 16-foot tall, L-Class high-power rocket and planned their launch event from a ranch near Kiowa, Colo. The interns literally "*launched their Future*" and the flight was perfect. Michael Gass, ULA president & CEO, commented that "it looks like we have started a tradition here." And that was indeed the case. (Figure 1)

**Figure 1. The 2008 Inaugural Flight of the ULA Intern Rocket Project, featuring the 16 foot tall, L952W-Powered "Future" Rocket** ***(Photo Credit Michelle Arend)***

The ULA intern rocket team created a new name for themselves in the summer of 2009. ULA SPIRIT (Sky Piercing Intern Rock-It Team) created an even larger rocket - a 20-foot tall, N-Class engine powered rocket. Also, the rocket was developed to carry and eject six payloads, the largest one being 11.4 inch diameter and 28 inches long. ULA invited Ball Aerospace Corporation in early 2009 to become a partner in the project. It was a perfect partnership with a company that builds space launch rockets teaming with a company that builds spacecraft and scientific instruments. The ULA interns would build the high power rockets while Ball interns would build payloads for the rockets. The Ball team also created a team name—BIRST (Ball Intern Rocket Science Team). In July of 2009, the SPIRIT and BIRST teams successfully launched their 2009 Future rocket, carrying a myriad of payloads, including scientific instruments (temperature, humidity, and pressure sensors, GPS, etc.), a human spaceflight landing experiment (egg drop contraption), a variety of cameras, a smoke grenade, and a squadron of 100 neon alien paratroopers (small action figures each with their own 8" diameter parachute). (Figure 2)

**Figure 2. Launch of the 20 Foot Tall 2009 Future Rocket as Viewed from a Distant Aircraft with a Big Zoom Lens** ***(Photo Credit Joe Petrowski)***

In 2010, the ULA interns upgraded the rocket by using the 2009 Future rocket as the upper stage of the 2010 Future rocket. They built a new booster stage, powered by two clustered N2000W engines. The 2010 Future stood 25 feet tall and weighed 280 lbs. at liftoff. It was the largest rocket ever launched in the state of Colorado!

In addition, they built a new rocket called Stars "N" Stripes, a 17 foot tall, 11.4 inch diameter rocket powered by a single N engine. This additional rocket was developed to provide two additional large payload volumes for Ball interns to make even more large payloads to fly on the rockets. Stars "N" Stripes had a successful flight in 2010. However, the two-stage, 3-N engine, 280 lb Future rocket suffered a structural failure in the attachment hardware for its two-drogue parachute system (due to a high horizontal velocity at apogee of about 140 m.p.h.). Then, the main 24 foot diameter chute, which deployed at about 300 m.p.h. on the way down, had no chance. Consequently, the recovery crew went to the landing site with shovels, trash bags, and somber expressions on their faces to address the wreckage. (Figure 3)

**Figure 3. The 2010 Future – "It was a good rocket"** ***(Photo Credit Mike Underhill)***

### Aerospace Industry Internships

Successful internship programs are a win-win situation for both the students and the corporations involved. ULA and Ball place a great emphasis on finding and hiring dozens of bright and diverse intern students each summer. It gives them an opportunity to "try out" the students and see how they perform outside their academic environment. It also allows the companies to start training and familiarizing the students with the corporate culture and company procedures so that, when they graduate, hopefully they will be hired into the company and be able to hit the ground running. Some students return to ULA and Ball internships for more than one summer stint. This benefits the students, because they get a variety of different assignments and managers, helping them learn which areas they may prefer to work in when they graduate. And, it benefits the companies because the diverse experiences make them well-rounded employees. Many interns return and are hired on as full-time employees at ULA and Ball when they graduate.

Colleges and Universities prepare most students quite well for a career in the aerospace industry by teaching them to think logically and how to apply technical theories to common problems. But most real world engineering problems are not like textbook problems; there is not always one obvious correct answer. Engineering internships expose the students to real world problems, and involve them in projects that can take hundreds of people, working together for several years, to complete. Many interns comment about how surprised they were to find out how important (and sometimes difficult) communication and teamwork is to getting things done. With huge projects involving many people and months or years of activity comes paperwork and procedures that take time to learn, and even longer to appreciate their value. The internship exposes the students to this real world environment and prepares them to be valuable and contributing members of a high caliber team working on high stakes projects, like launching some of our most valuable national assets into space.

But even if a student has all the book knowledge they need to be successful, there is one element of experience that is often lacking in students and, for that matter, even in some relatively seasoned engineers, and that is hands-on experience. An engineer who has built parts, then run into problems assembling them, learned from that experience. An engineer who has first hand experience building composite parts can design better composite parts. An engineer who has been surprised by results they got while running a test will learn from that result, and learn the importance of “testing like you fly,” and learn how to run better tests in the future. In short, hands-on experience strongly compliments formal education and training.

This is where ULA’s Intern Rocket Project fits in. All interns are encouraged to participate in the project. In fact, those with little or no hands-on experience are encouraged to participate the most, because they will benefit the most. While the interns' day jobs at ULA and Ball are paid positions, participation in the intern rocket project is voluntary, unpaid, and done after normal work hours. About 80 percent of the interns volunteer to work one or more evenings per week on the project.

### 2011 Intern Rocket Project

Planning for the 2011 Intern Rocket Project actually began in October of 2010 when ULA invited Colorado high schools to participate for the first time. The 2011 ULA Intern Rockets would be equipped to launch and deploy eight small payloads that would be built by high school teams. The compartment for each small payload would be 3.9 inches in diameter by 6 inches long. Whatever they could dream up and put in the compartment, they could fly. Proposals were submitted by many high school teams, and due to high demand for payload spots from the high schools, the payload accommodation system design on the Future rocket was expanded to carry four additional small payloads, for a total of 12 (in addition to the two large payloads provided by Ball Aerospace interns). Further demand for payload space resulted in payload accommodations being added to some of the smaller rockets, such that the six ULA rockets to be launched could carry a total of 20 payloads—16 provided by high school teams and four provided by the BIRST team at Ball Aerospace. Payload spots were awarded to high school teams in January and the teams spent the remainder of the school year working on their payloads.

In late May and early June, interns began arriving at ULA and Ball. They had just eight weeks to build their creations before the planned launch date of July 30. ULA interns began the first week by making the airframe for the 25 foot tall Future rocket, which was made in several 94 inch long x 11.6 inch diameter sections. The sections were made with carbon fiber cloth using a wet hand-layup process and ambient cure over an 11.4 inch outer diameter phenolic mandrel, which was made from an 11.4 inch inner diameter tube. (Figure 4)

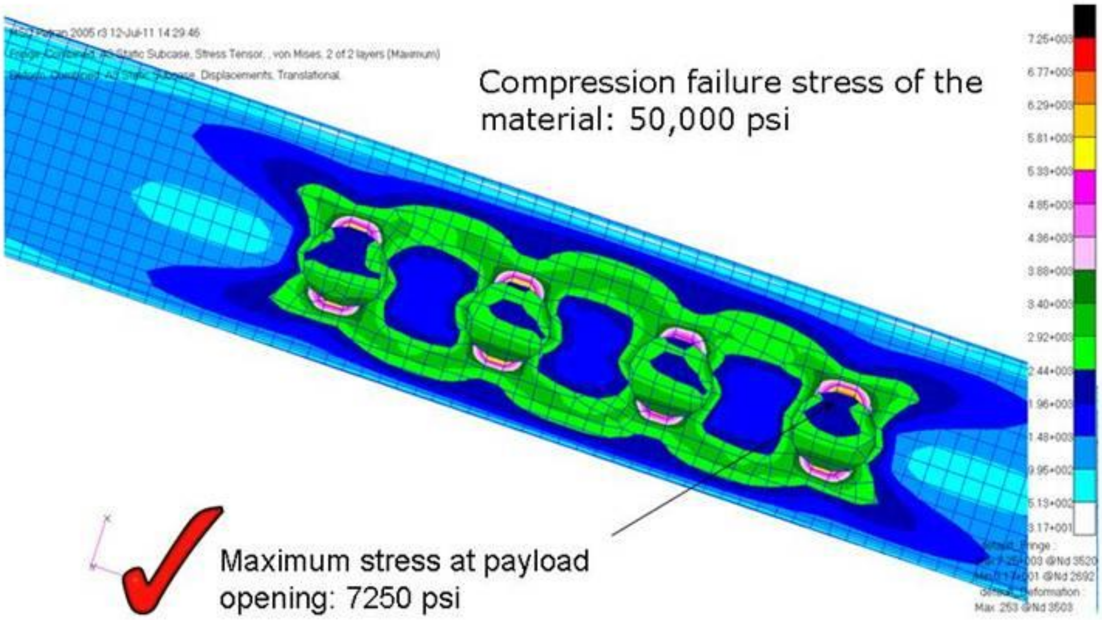
**Figure 4. Interns Handcrafting the Carbon Fiber Airframe for the 2011 Future Rocket** ***(Photo Credit Greg Arend)***

Over subsequent weeks, interns made and installed fins, built electrical harnesses, made various piece parts, and integrated and tested individual components and systems. Most of the rocket flight functions were performed by two Perfectflite MAWDs and 25 Perfectflite timers. These devices used MJG Technology Inc. electric matches to fire black powder charges ranging from 0.67 grams for the small payload deployment systems to 26.0 grams for the main payload and parachute deployment system. The MAWDs were tested by placing them in a pressure chamber (sealed plywood box) and pumping down the pressure to simulate ascent depressurization, thus verifying that the e-matches were properly firing at apogee. Each of the 25 timers was subjected to simulated liftoff acceleration to verify the timers triggered at an acceptable G level and then fired their pyro circuit at the appropriate time. The acceleration test apparatus was a centrifugal device designed and built for the ULA intern rocket project by a team of engineering students at Duke University, led by 2010 ULA intern Sam Klein, as part of their senior design project. Payload and parachute ejection systems were built and tested to confirm functionality, and to establish the minimum amount of charge required to perform their function. The importance of testing like you fly, redundancy, and demonstrating functional and structural margin were stressed.

Interns signed up to work on the project one or more evenings (Monday-Thursday) per week. A typical work night lasted from 5-7:30 p.m. and started with the students hearing a brief introduction to the work they would be performing that evening while they munched on pizza. Then, four or five ULA mentors would each lead a team of two to three interns and work would be done on multiple projects in parallel. The mentors ranged from talented-but-barely-older-than-the-interns employees like Mike Underhill and Kelly McTeer, to mid-career professionals like Greg Arend, Steve Dean, Art Hemphill, and Jeff Jones, to former executives, like retired Atlas Program Vice President Ed Bock and retired Chief Engineer for Atlas Vehicle Development Norm Viste.

Some of the interns took on additional roles, above and beyond building the rocket one night per week. Troy Langford, Jason Panzarino, and Chelsea Welch, with the assistance of mentor Scott Wasinger, verified the rocket's stability by measuring and managing the mass properties and running a Rocksim flight simulation. Rachel Chetham created a finite element model of the airframe structure including the cutouts for the small payloads to eject from, and showed analytically that the structure had more than adequate structural integrity for the predicted flight loads. (Figure 5)

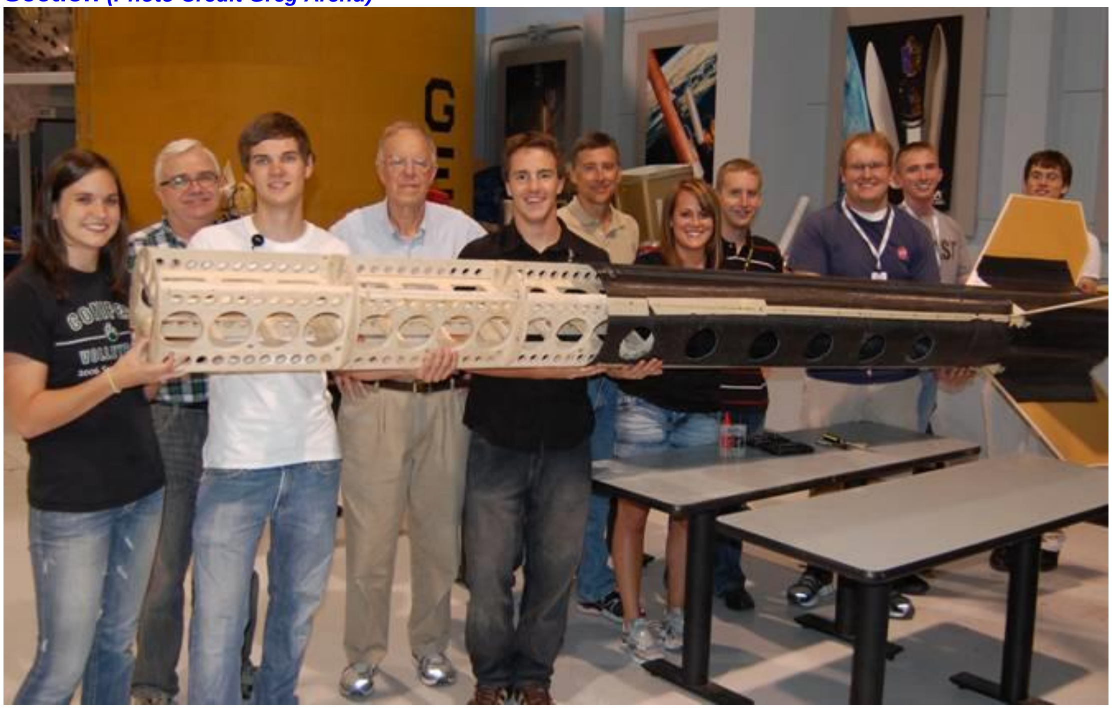
**Figure 5. Finite Element Stress Analysis of Airframe Computing Stress Levels around Payload Ejection Holes**




Rachel also organized and directed the rocket and payload recovery teams on launch day. Vanessa Hermida (with mentor Roy Adams) organized many of the event logistics on and prior to launch day. Jeff Buswell managed and operated all the airborne camera systems. Natascha Trellinger, Amanda Kuker, Nick Gianapolous, Troy Langford, and Jessica Hissem volunteered to be foster parents for some of the high school payloads that were delivered prior to launch day. Valerie Meusburger was the parachute packing lead for all the rocket parachutes. Joshua Herrmann, already certified to Level 2 in High Power Rocketry, performed a detailed procedure review and verified procedure operations on launch day. In total, more than 50 ULA interns and 15 ULA mentors in Denver worked on various aspects of the program to pull it all together in just eight weeks. This does not include the activities going on at the ULA offsites, at Ball Aerospace in Boulder, or with the 16 high school teams.

The majority of ULA's interns work at Denver, Colo., area facilities. But ULA has offsite facilities in four other states that employ anywhere from two to eight interns each. This year, interns in Harlingen, Tex., built the avionics module for the Future rocket. Interns in Cape Canaveral, Fla., built a module for the upper stage that housed the upper stage engine and a deployment system for four drogue parachutes. Interns in Decatur, Ala., and Vandenberg Air Force Base, Calif., each built a dispenser module to carry and deploy four small payloads. Interns in Denver built a third such module, which enabled the Future rocket to carry 12 small payloads built by high school teams, in addition to two larger payloads built by Ball Aerospace interns. These modules were then shipped to the interns in Denver for final assembly and integration into the rocket. (Figure 6)

**Figure 6. Inserting the Small Payload Dispenser Support Structures into the Aft Airframe Section** ***(Photo Credit Greg Arend)***



Ball Aerospace had more than 35 interns in Boulder, Colo., working to build payloads for the rockets. The BIRST team was divided into four sub-teams, each led by one or two mentors, and each tasked with coming up with an idea for, designing, then building a payload. Ball was allocated two payload spots on the Future rocket and two payload spots on the Star "N" Stripes rocket. Ball's payload compartments were larger than the high school teams', ranging in size from 7.5 inch diameter x 15 inch long, up to 11.4 inch diameter and 34 inches long. And they took advantage of these larger compartments with some very clever payload ideas!

Ball Payload #1 flew on the Stars "N" Stripes rocket and was built by the team named "The Spirit of Adventure." The payload was an attempt to create a live action version of Pixar's movie "Up!" It consisted of a brightly colored house complete with helium-filled balloons. Attached to the house's parachute was a solid state camera which was designed to take a steady video of the house's descent. Inside the house there was a GPS unit to transmit live altitude, speed, and location information back to the team.

Ball Payload #2 flew on the Stars "N" Stripes rocket and contained an elevated-remote launch/recovery system that was jettisoned from the rocket at 25 seconds after liftoff. Sixty seconds after liftoff, an Estes C-class rocket was designed to be launched from a compartment within a canister descending under parachute. This rocket contained an electronics suite to track altitude, G-force, and temperature. The canister was designed to deploy an airbag inflated in flight to cushion the landing. Once on the ground, a custom-built remote controlled car was designed to emerge from the canister. The RC car was to be driven from the landing site back to the ground support station via GPS live video signal and controlled through a laptop PC on a re-mapped X-Box 360 remote control over a 900MHz frequency.

Ball Payload #3 flew on the Future rocket. Ball team #3 named "Bullwinkle" designed their payload to be a module consisting of five sub-payloads to be ejected from inside the nose cone. The main payload, an inflatable Moose head, was to be deployed using a parachute which would detach once the deployment was complete. Next, the payload would invert and the main parachute would deploy and pull on a mechanical switch to inflate the Moose head with compressed $CO_2$, which was to define the field of view of the camera to record the topography during the decent. During the entire launch and recovery, a GPS, locating beacon, temperature and humidity monitor would collect data profiling the events.

Ball Payload #4 flew on the Future rocket.  Payload #4 was built by a team code named "Maverick."  Team Maverick completed a payload including three sections.  The first section was an R/C helicopter enclosed in a secured case.  The helicopter was designed to be ejected from its payload tube at approximately 1000 feet AGL, recovered, and flown back to the launch pad.  The second section called "Jars to Stars" was a replica of a model created in 2006 to celebrate Ball Aerospace's 50th anniversary and its heritage tied to the canning industry.  It also was to be ejected from the payload tube at approximately 1000 feet.  The third section was a remote sensing and telemetry payload which included two still cameras to capture panoramic views during descent, one video camera to capture video of the descent, a thermometry suite to collect launch and descent temperature data, a relative humidity sensor, plus an accelerometer instrument. (Figure 7).

**Figure 7.   Ball BIRST team members examine their camera bulkhead, which was part of Team Maverick's payload carrying a remote-controlled helicopter.** ***(Photo Credit Kendall Storaci)***

Sixteen teams from eleven high schools designed and built payloads to be launched in the ULA rockets. Twelve high school payloads were launched in the Future rocket, two were launched in a 13-foot tall L-class rocket named Icarus, and two more were launched in an eight-foot tall M-class rocket named The Reliant Robin.  Participating high schools included:

- Alamosa High School
- Arapahoe Ridge High School
- Bollman Technical Education Center
- Casa de la Esperanza
- Eaglecrest High School
- Englewood High School
- Frederick High School
- Harlingen High School
- Mapleton Early College High School
- Stem Academy
- Wasson School of Innovation

The high school payloads ranged from the fairly simple to rather complex, but all were creative and well developed by the teams. Payloads included skydiving school mascots, a variety of cameras, various scientific instruments and measuring devices, a tribute to famous scientists, a tribute to the diverse ethnicities of students at one of the schools, propellers that measured wind blade efficiency, etc. Among the more elaborate high school payloads were a radio-controlled glider that was deployed from the rocket, and a 1000-foot long streamer designed to characterize wind profiles at various altitudes.

### July 30, 2011 - Launch Day

The 2011 Launch Event was held at the Hudson Ranch launch site near Pueblo, Colo. The site, which was also the site where NARAM-52 was held, is operated by the SCORE (Southern Colorado Rocketeers) organization. Jason Unwin of SCORE, and Dr. Warren Layfield of CosRocs and the rest of the SCORE and CosRocs teams did a phenomenal job is assisting in the planning and organizing of the event with Ball and ULA.

The first ULA launch of the day was a 1/10th scale MX-774 rocket, which flew successfully on an I-class motor to about 4,000 feet. The second launch featured the successful launch of the Cosmos rocket, an I-Class masterpiece built by ULA intern Jorge Torres. Next up was the second largest rocket of the day, the 17 foot tall N-Class Stars "N" Stripes rocket, which was built by the 2010 ULA interns, and refurbished for flight by the 2011 interns. This rocket was designed to stay under 5,000 feet AGL, and in order to do so it ignited four H-Class retro rockets (two red and two blue flames), one mounted backwards on each fin tip, at 2.5 seconds after liftoff to fight against the N engine thrusting it upward to an eventual altitude of 4,400 feet AGL, at which point it deployed its two Ball Aerospace built payloads and its parachutes. (Figure 8)

**Figure 8. The 17' Tall Stars "N" Stripes Rocket Fires 4 Red and Blue H-Class Retro-Rockets to fight against the White N-Class Main Engine in Order to Limit Altitude** ***(Photo Credit Ray LaPanse)***


Payload #1 on the Stars "N" Stripes rocket, the Up! House, successfully deployed and fell safely back to the ground under its parachute. The house was recovered intact. The electronics system experienced an anomaly during launch and could not transmit live GPS data back to the team's computer. Due to a malfunction internal to the camera, the team was only able to recover 30 minutes of footage from inside of the rocket before the camera turned off. Payload #2 was jettisoned from the rocket, but due to a tangled parachute, the payload's "airbag" landing system was only partially inflated and the canister fell at a faster rate than anticipated. The team had a successful secondary aerial launch of its Estes C-class rocket 60 seconds after takeoff but the remote controlled vehicle suffered damages in the landing and was not able to be driven to the landing site of the BIRST team rocket. Matt Gross, Ball Aerospace mentor for Payload Team #2, commented after the launch, "I couldn't be more impressed with the impact that this program had on students. Each intern was able to see a condensed version of the entire aerospace life cycle- from concept, to design, to build, to test, to launch. It's experiences like this that will help solidify the return of fresh minds to the aerospace industry. (Figure 9)

**Figure 9. Ball Aerospace BIRST team members track their payload - a modified RC vehicle and a small rocket that was launched in mid descent - after it was deployed by the Stars-N-Stripes rocket.** ***(Photo Credit Kendall Storaci)***

Two days of on pad preparations were required to configure the Future rocket, launch pad, and payloads for flight. Thirty minutes before its scheduled launch, the team completed the preparations and cleared the pad. (Figure 10) The Future rocket lifted off three minutes before its advertised launch time of 12p.m. With the hazard zone clear of people and the remote wind anemometer indicating winds at the pad of just five m.p.h., the launch team saw no reason to wait. As Master of Ceremonies and ULA intern Brian Hudson counted down to zero on the public address system, ULA interns Adam Wiktor and Ben Woeste issued the commands on the refurbished 1961 vintage Atlas missile launch control panel, and both Aerotech N2000W engines in the first stage roared to life. (Figure 11)

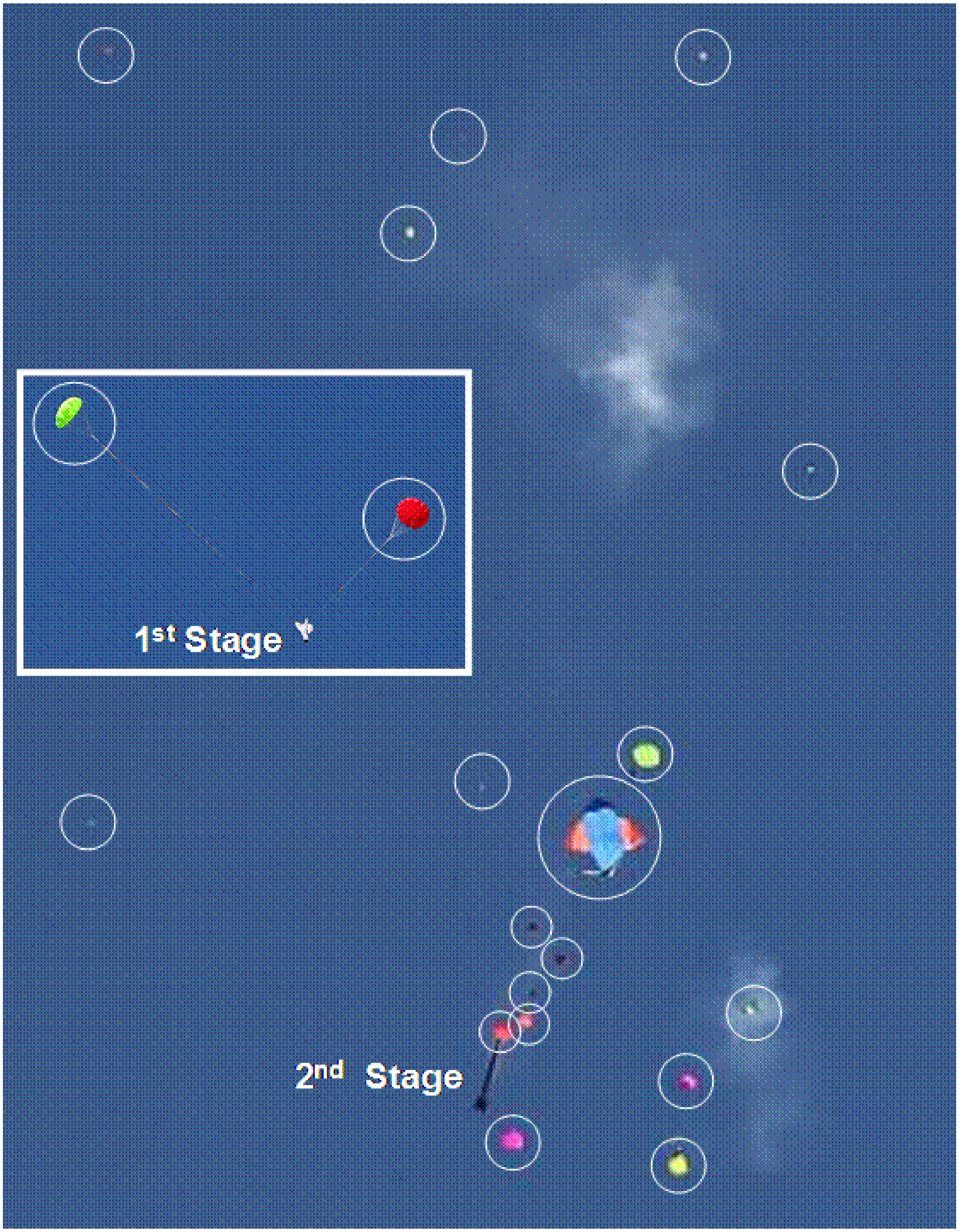
**Figure 10. Future Launch Crew Just Before Clearing the Pad** ***(Photo Credit Ray LaPanse)***

**Figure 11. Liftoff of the 25' Tall Future Rocket Powered by Twin N2000W 1st Stage Engines** ***(Photo Credit Ray LaPanse)***

At T+7 seconds, the first stage engines burned out. The first stage did not drag separate, so at T+8 seconds, dual black powder charges in the inter-stage compartment fired, successfully separating the stages. At T+9 seconds the upper stage engine ignited, and the roar from the crowd almost exceeded the roar of the engines. (Figure 12) Five seconds later, two 10 foot diameter parachutes deployed to return the first stage safety to the ground. The Future then soared up to an apogee altitude of 8,050 feet AGL at T+30 seconds. At apogee, with a nice and slow horizontal velocity of about 50 m.p.h., Future deployed a 3 foot diameter drogue chute, followed one second later by a 4 foot diameter drogue chute, followed by two 6 foot diameter drogue chutes. At T+40 seconds, while falling under the four drogue chutes at 43 m.p.h., the Future initiated a deployment sequence where it ejected two small payloads at a time out opposite sides of the rocket every three seconds until 10 of the 12 high school payloads were deployed. The other two high school payloads opted to remain in the rocket and not be ejected. At T+60 seconds, Future ejected its main payload, the 24 foot diameter main parachute, and the nose cone. At T+65 seconds, the free-flying nose cone ejected another payload from inside the cone, and parachutes deployed for that payload and the nose cone to return them safely to ground. In total, there were 20 parachutes involved in bringing all the rocket segments and payloads to the ground. (Figure 13) A large team of interns was then dispatched to find and recover all the parts from the rocket.

**Figure 12. Future 1st Stage Separation and 2nd Stage Ignition.** ***(Photo Credit Ray LaPanse)***

**Figure 13. Future Rocket After deployment of its 20 Parachutes - 2 for 1st Stage, 6 for 2nd Stage, 12 for Payloads** ***(Photo Credit Ray LaPanse)***




All the major rocket segments and the two large Ball Aerospace payloads were found, but a few of the smaller high school payloads were never located. (Figure 14) Ball Payload #3, known as "Bullwinkle," deployed successfully from the Future rocket, with its parachute triggering the compressed CO2 canister that fully inflated the giant moose head which could be seen by spectators as it floated to the ground. The nose camera suffered damages during deployment but the other instruments on board were still working upon recovery.  Ball Payload #4, the Maverick payload, deployed “Jars to Stars” (a space station made of Ball jars) and the RC helicopter drop box at an altitude of about 7,000 feet instead of at 1,700 feet which it was designed for.  “Jars to Stars” fell safely under its parachute and was recovered intact.  The helicopter was separated from its drop box on deployment, yet it suffered very little damage and was flown back to the launch pad after initial recovery.  "It was definitely nerve-racking to watch all of our hard work go up and then come down, but it was exciting to work on something that got launched on such a huge rocket," said Lee Wilson, a member of Ball Payload Team #4.  "It was a lot of fun to see our hard work come to fruition as we flew our helicopter back to the launch pad then up to the crowd."

**Figure 14.  ULA Interns Return After Launch with the Weight of the Future on Their Shoulders** ***(Photo Credit Ray LaPanse)***

Following the launch of Future was the launch of the Icarus, a 13 foot tall, L952W powered rocket that carried two payloads – a radio controlled glider and an instrumentation suite in the nose cone.  The nose cone drifted far away under a separate parachute was missing in action until it was located by a search team three weeks later.  The last ULA launch of the day was the Reliant Robin, an 8 foot tall M1419W powered screamer that flew to just 50 feet shy of the 10,000 foot AGL clearance altitude, at which point it deployed a 1000 foot long bright yellow streamer with a weight at one end and a parachute at the other.  The streamer was tracked by ground-based synchronized cameras which triangulated the position of the streamer in order to reconstruct the wind profile at various altitudes.  Dozens of other model rockets and high power rockets launched by members of the SCORE and CosRocs teams kept the spectators entertained between the ULA/Ball rocket launches.

Based on the number of hoops, hollers, handshakes, hugs, and high-fives from a crowd of about 1,000 spectators, the event appeared to be a major success.  At the end of the day, all of the rocket systems performed as designed, with the exception of loss of audio on two of the airborne video cameras.  Many of the payloads worked as planned.  Some did not.  A few of the smaller high school payloads were never found.  But the more than 200 high school and college students who contributed to the project all learned something from the experience. And all the project members went home with a feeling of satisfaction that they had contributed to something special.

ULA intern Elyssa Kaszynski, who was in charge of building, installing and testing payload and parachute ejection systems, summed up her experience saying, “I can’t tell you how valuable working on the rocket was for me. I’ve never been so nervous, and then instantly proud, when I saw the payloads and chutes deploy. Thanks for giving me that responsibility and believing that I could do it.”

Matt Smith, ULA’s vice president of Engineering, added, “The launch of the ‘Future’ and this intern project in general, is symbolic in so many ways. ULA launches missions that enable us to explore our universe, improve life on Earth and protect our nation, ensuring a brighter future for us all. These students are the rocket scientists of tomorrow and thanks to their hard work and talent, they will continue this legacy for years to come.”

ULA summer interns have opportunities to a work on a variety of launch vehicle design and analysis activities in Centennial, Colo; to support launch vehicle production work at facilities in Texas, California and Alabama; and to support assembly, test and launch operations at Vandenberg Air Force Base, Calif., and Cape Canaveral Air Force Station, Fla. United Launch Alliance offers a diverse, fast-paced and involved team environment. ULA is an equal opportunity employer committed to a diverse workforce. The company is headquartered in Centennial, Colo. For more information on United Launch Alliance, the summer internship program, the intern rocket launch, or high school payload opportunities on the 2012 Future rocket, please visit the Education & Exploration link on ULA's website at www.ulalaunch.com.

Ball Aerospace summer interns work in a variety of positions, from engineering to human resources. The positions give interns the opportunity make significant contributions to company programs. Ball Aerospace is a leader in the design, development, and manufacture of innovative aerospace solutions and the diverse perspectives and creative ideas that interns bring to the company are central to the company’s future. Summer internships are available at the Boulder, Broomfield, and Westminster facilities in Colorado, as well as in Albuquerque, New Mexico and Dayton, Ohio. Ball Aerospace is a subsidiary of Ball Corporation and is proud to be an equal opportunity employer committed to a diverse workforce. The company is headquartered in Broomfield, Colo. Additional company information and internship opportunities can be found under the Careers tab on Ball Aerospace’s website: www.ballaerospace.com.

A video of the 2011 ULA/Ball Rocket Launch event can be viewed at the following link:
http://www.youtube.com/watch?v=eawfOv-xApE