

**2002 – 2003 Oregon State University Microgravity Flight Team**  
*Bubble Coalescence in Microgravity*

**Abstract**

The Unus Boule II (° one bubble (lat.)) experiment proposed by the Oregon State University Microgravity Flight Team 2003 is designed to succeed where Unus Boule (flown by OSUMFT 2002) failed. Just like the original, Unus Boule II is designed to visually record the range of velocities and sizes under which bubbles coalesce in microgravity. Bubbles of varying diameter and velocity will be impacted to observe coalescence and non-coalescence. Visual data will be recorded with a digital video camera and analyzed at the Oregon State University Advanced Thermal Hydraulics Research Laboratory (ATHRL) using MATLAB image processing software. After significant investigation of the design failures of the original apparatus, the Unus Boule II (UBII) team will engineer, construct, and test a revised Bubble Injection Bay (BIB).

The OSU-UBII team will also complete an extensive outreach program aimed at interesting young people in space science and the Reduced Gravity Student Flight Opportunities program, as well as communicating the analyzed data and resulting report to academic and professional communities. Several groups of high school students will design and build accelerometers to be tested on the KC-135. Another section of our outreach will be dedicated to dispelling the myth that high solar weather activity delivers a dangerous level of radiation dose to passengers in commercial airline flights.

The experimental investigation into the properties of bubble coalescence is problematic to complete successfully under standard gravitational conditions and would therefore generate the most pertinent data in the microgravity environment onboard the KC-135. Determining the velocities and diameters under which bubbles are most likely to coalesce would allow much more precise modeling of two-phase and two-fluid flow. Fluid flow velocities could be calculated to aid either disintegration or coalescence of bubbles depending on the specific industrial or scientific application.

<b>Team Coordinator</b>	Marcia Whittaker, NE 2005
<b>Advisor</b>	Dr. Qiao Wu, NE
<b>Flight Crew</b>	Rachel Wittrock, ME 2005; Dan Wittmer, EE 2005 Marcia Whittaker, NE 2005; Mark Shaver, NE 2005 Alternate Luke Toman, Physics 2004
<b>Ground Crew</b>	David Stanley, BioE 2006
<b>Support</b>	Angela Ernst, 2005; John Fiamengo, NE 2003; Eric Oviat, NE-RHP 2003; Jun Joonyub, NE 2004; Tim Kuchler, BioE 2005