**Nano-ADEPT**

**ADEPT**

Entry technology (2m-dept, 4-dept):
1. Adaptable Deployable Entry and Placement Technology
2. Large ADEPT (5-12 diameter) out performs rigid aeroshell on traditional performance dimensions
   - Deceleration load benefit for Venus In-Situ Explorer (VISE) - 30 g peak deceleration (6 m/70°) vs. 300 g on a traditional rigid aeroshell (3.5 m/70°)
   - Landed altitude benefit for Curiosity-class robotic Mars missions - enables subsonic parachute deployment at high altitudes (9-12 m/45°)
   - Landed payload mass fraction benefit for human Mars precursor missions (5-12 m/45-70°)

**Nano Satellite ("Nano-Sat")**
1. A satellite with mass less than ~10 kg.
2. The state of the art in small spacecraft has advanced tremendously in the last few years by embracing secondary payload launch opportunities
3. Small spacecraft keep costs low by using standardized launch vehicle last few years by embracing secondary payload launch opportunities
4. Over 1,000 interfaces and minimizing impact on the mission of the primary payload

**QUESTION:** What would a “nano” ADEPT look like that embraces the tenets of the small spacecraft movement? **What are the capabilities?**

<table>
<thead>
<tr>
<th>Entry Conditions (Nominal EPLA)</th>
<th>Mars Secondary Payload</th>
<th>Earth Entry from LEO</th>
<th>Venus Secondary Payload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone Angle, °</td>
<td>70</td>
<td>7.6 km/s, -135°</td>
<td>31.5 km/s, -45°</td>
</tr>
<tr>
<td>Entry Mass, kg</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Ballistic Coefficient, g/cm²</td>
<td>22.5</td>
<td>22.5</td>
<td>22.5</td>
</tr>
<tr>
<td>Peak Heat Flux, W/cm²</td>
<td>54</td>
<td>75</td>
<td>293</td>
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<tr>
<td>Total Heat Load, kJ/cm²</td>
<td>1.7</td>
<td>1.4</td>
<td>4.0</td>
</tr>
</tbody>
</table>

**Full-Scale Nano-ADEPT Wind Tunnel Test**
NASA Ames 7’x10’ Wind Tunnel, January 2015

**System-Level Nano-ADEPT Pathfinder Arc Jet Test**
NASA Ames Interactive Heating Facility, November 2014

**Example Nano-ADEPT Entry Environments**

**CONOPS**

1. Launch of SpaceLoft XL From White Sands, NM
2. Yo-Yo De-Spin
3. Separate Nose Cone
4. ADEPT Ejection
5. Deployment
6. Re-Entry Mach ~3.1 Peak Decel ~4 g Peak Dyn. Pressure ~0.8 kPa Impact Velocity ~ 20 m/sec
7. Recovery in WSMR

**A Droid is underway now to rapidly mature and demonstrate flight readiness of Nano-ADEPT for applications across the solar system.**

**Nano-ADEPT Full-Scale Flight Test**

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**NASA Ames Research Center**

**Brandon Smith**

**Ethiraj Venkatapathy**

**Entry Systems and Technology Division**

**Contact:** ethiraj.venkatapathy-1@nasa.gov