<table>
<thead>
<tr>
<th>Title</th>
<th>Topic</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Pixel</td>
<td>Imaging Devices</td>
<td>JPL</td>
</tr>
<tr>
<td>High Speed ADC</td>
<td>High Speed &amp; Bandwidth</td>
<td>NRL</td>
</tr>
<tr>
<td>High Speed ADC</td>
<td>High Speed &amp; Bandwidth</td>
<td>Aerospace</td>
</tr>
<tr>
<td>Advanced Solar Cells</td>
<td>Power Generation</td>
<td>NRL</td>
</tr>
<tr>
<td>Microprocessor</td>
<td>On-Board Processing</td>
<td>NRL</td>
</tr>
<tr>
<td>ULP-Solid State Recorder</td>
<td>Low Power Applications</td>
<td>UNM</td>
</tr>
<tr>
<td>ULP-Microprocessor</td>
<td>Low Power Applications</td>
<td>UNM</td>
</tr>
<tr>
<td>Data Path Pipeline</td>
<td>On-Board Processing</td>
<td>UNM</td>
</tr>
<tr>
<td>High Speed RTD/HEMT</td>
<td>High Speed &amp; Bandwidth</td>
<td>NRL</td>
</tr>
<tr>
<td>Fault Tolerant Computing</td>
<td>On-Board Processing</td>
<td>NRL</td>
</tr>
</tbody>
</table>
Summary of Microelectronics Session

- Total of 11 Presentations Covering Multiple Topics:
  - Higher speed and Bandwidth (4/11)
  - On-Board Processing (5/11)
  - Low Power Applications (5/11)
  - Power Generation (1/11)
  - Imaging Devices (1/11)
  - Photonics (0/11)
  - MEMS (0/11)

- Common Themes
  - Verification of Ground Test Protocols
  - Validation of Models
**Living with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology**

<table>
<thead>
<tr>
<th>Type of Microelectronic(s):</th>
<th>Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Purpose Processor FPGA &amp; FT Technology</td>
<td>Flight Testbed for General Purpose Computing and Fault Tolerance Technology</td>
</tr>
</tbody>
</table>

| Background: No more than 5 sentences here…. ARGOS Follow on using new hardware and new fault tolerance software |

| Description of Technology Requirement for On-Orbit Testing: |
| No more than 5 sentences here…. Be able to run multiple processors for prolonged periods with ability to uplink code. |

| Timeframe Technology is Needed: NOW |
| Timeframe Technology Maturity: Evolving in responses to new Processors |

| Benefits to LWS Applications Areas: |

| Flight Requirements: *(If known)* |
|-----------------------------|--------|
| Orbit: Flexible |
| Altitude: |
| Inclination: |
| Power: 10 W |
| Weight (kg): Few kg. (2 boards) |
| Size (cm): |
| Telemetry: |
| Environment Measurement: |

| Benefit(s): |

<table>
<thead>
<tr>
<th>Benefiting Mission(s):</th>
</tr>
</thead>
</table>

| Benefits to LWS Applications Areas: |

<table>
<thead>
<tr>
<th>Name: Kent Wood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone: 202-767-2506</td>
</tr>
<tr>
<td>Email:</td>
</tr>
</tbody>
</table>

| Organization: NRL Code 7621 |
### Living with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology

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<thead>
<tr>
<th>Type of Microelectronic(s):</th>
<th>Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADC/DAC</td>
<td>High Speed ADC/DAC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Background: No more than 5 sentences here….</th>
</tr>
</thead>
<tbody>
<tr>
<td>High and width ADC/DAC Measurement Techniques &amp; Model Verification Utilize SiGe, GaAs, InP etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description of Technology Requirement for On-Orbit Testing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>No more than 5 sentences here….</td>
</tr>
<tr>
<td>Availability of adequate power</td>
</tr>
<tr>
<td>Change Mode/Frequency of Operation</td>
</tr>
<tr>
<td>Variable Inputs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timeframe Technology is Needed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timeframe Technology Maturity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now – 4yrs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flight Requirements: <em>(If known)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbit: Variable – High Radiation Environment</td>
</tr>
<tr>
<td>Altitude: Go Through Belts</td>
</tr>
<tr>
<td>Inclination:</td>
</tr>
<tr>
<td>Power: 10W/device</td>
</tr>
<tr>
<td>Weight (kg): 400gms</td>
</tr>
<tr>
<td>Size (cm): 10x10 cm</td>
</tr>
<tr>
<td>Telemetry: Not defined.</td>
</tr>
<tr>
<td>Environment Measurement: Temp., Proton spectrum &amp; dose LET Spectrum, Dose Rate, etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefiting Mission(s):</th>
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<tbody>
<tr>
<td>Benefits to LWS Applications Areas:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name: Art Campbell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone: 202-767-9043</td>
</tr>
<tr>
<td>Email:</td>
</tr>
<tr>
<td>Organization: NRL</td>
</tr>
</tbody>
</table>
Living with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology

<table>
<thead>
<tr>
<th>Type of Microelectronic(s):</th>
<th>Title: Advanced Solar Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Background: No more than 5 sentences here…. Amorphous Si, Multi-junction, Thin Films High power output, high voltage, light weight, low cost</td>
<td></td>
</tr>
<tr>
<td>Description of Technology Requirement for On-Orbit Testing: No more than 5 sentences here…. Sun Exposure</td>
<td></td>
</tr>
<tr>
<td>Timeframe Technology is Needed: 2-5 yrs</td>
<td></td>
</tr>
<tr>
<td>Timeframe Technology Maturity: 5 yrs</td>
<td></td>
</tr>
<tr>
<td>Benifiting Mission(s):</td>
<td></td>
</tr>
<tr>
<td>Benefits to LWS Applications Areas:</td>
<td></td>
</tr>
<tr>
<td>Name: Robert Walters</td>
<td></td>
</tr>
<tr>
<td>Phone: 202-767-2533</td>
<td></td>
</tr>
<tr>
<td>Email:</td>
<td></td>
</tr>
<tr>
<td>Organization: NRL Code 6820</td>
<td></td>
</tr>
</tbody>
</table>
## Living with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology

<table>
<thead>
<tr>
<th>Type of Microelectronic(s):</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Microprocessor</td>
<td>Microprocessor Test Chip</td>
</tr>
</tbody>
</table>

### Background: No more than 5 sentences here….
Custom Design, MOSIS Run, Designed to investigate mechanisms of error propagation Characterization and validation of ground test data and models

### Description of Technology Requirement for On-Orbit Testing:
No more than 5 sentences here….
Radiation environment

### Timeframe Technology is Needed:
NOW

### Timeframe Technology Maturity:
2yrs

### Flight Requirements: *(If known)*

<table>
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<tbody>
<tr>
<td>Altitude: Go through belts</td>
</tr>
<tr>
<td>Inclination:</td>
</tr>
<tr>
<td>Power: 2 W</td>
</tr>
<tr>
<td>Weight (kg): 200-400 gms</td>
</tr>
<tr>
<td>Size (cm): 10x10 cm</td>
</tr>
<tr>
<td>Telemetry:</td>
</tr>
</tbody>
</table>

Environment Measurement: Temp., Proton spectrum & Dose LET Spectrum, Dose Rate, etc…

### Benefiting Mission(s):

### Benefits to LWS Applications Areas:

<table>
<thead>
<tr>
<th>Name: Art Campbell / Kenny Clarck</th>
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<tbody>
<tr>
<td>Phone: 202-767-9043</td>
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<tr>
<td>Email:</td>
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# Living with a Star: Space Environment Testbed Program

## Microelectronics Technology

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<tr>
<th>Type of Microelectronic(s):</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ULP/CMOS</td>
<td>Ultra Low Power Electronics</td>
</tr>
</tbody>
</table>

### Background: No more than 5 sentences here….  
Ultra Low Power, Radiation tolerant,  
Solid State Recorder – SRAM Design w/ Error Correction  
Microprocessor Suite – 8051, C50, Data Path Pipeline  
Image Processor

### Description of Technology Requirement for On-Orbit Testing:  
No more than 5 sentences here….  
Image data source to store and dump image data

### Timeframe Technology is Needed:  
Benefiting Mission(s): ALL LWS missions

### Timeframe Technology Maturity:  
Benefits to LWS Applications Areas: ALL

### Flight Requirements: *(If known)*

- **Orbit:** Unspecified  
- **Altitude:**  
- **Inclination:**  
- **Power:**  
- **Weight (kg):**  
- **Size (cm):**  
- **Telemetry:**  
- **Environment Measurement:**

- **Name:** Gary Maki
- **Phone:** 505-272-7050
- **Email:**
- **Organization:** University of New Mexico
**Life with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology**

<table>
<thead>
<tr>
<th>Type of Microelectronic(s):</th>
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<tbody>
<tr>
<td>High Speed Logic</td>
<td>High Speed RTD/HEMT</td>
</tr>
</tbody>
</table>

**Background:** No more than 5 sentences here….
Low Power, Multi-level High Speed Logic
SEU comparison of hardened and unhardened parts
InP based, In As based

**Description of Technology Requirement for On-Orbit Testing:**
No more than 5 sentences here….
Undefined

<table>
<thead>
<tr>
<th>Timeframe Technology is Needed:</th>
<th>Benefits to LWS Applications Areas:</th>
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</thead>
<tbody>
<tr>
<td>2-5 yrs</td>
<td></td>
</tr>
<tr>
<td>Timeframe Technology Maturity:</td>
<td></td>
</tr>
<tr>
<td>2-6 yrs</td>
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**Flight Requirements: (If known)**

- Orbit: Variable – High Radiation Environment
- Altitude: Go Through Belts
- Inclination:
- Power: 2 W
- Weight (kg): 200-400 gms
- Size (cm): 10x10 cm
- Telemetry:
- Environment Measurement:

**Benefiting Mission(s):**

**Benefits to LWS Applications Areas:**

**Name:** Art Campbell/Dale McMorrow/B. Weaver

**Phone:** 202-767-8043

**Email:**

**Organization:** NRL Code 6820
## Living with a Star: Space Environment Testbed Program Spacecraft Microelectronics Technology

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**Background:** No more than 5 sentences here…. ARGOS Follow on using new hardware and new fault tolerance software

**Description of Technology Requirement for On-Orbit Testing:**
No more than 5 sentences here…. Be able to run multiple processors for prolonged periods with ability to uplink code.

**Timeframe Technology is Needed:**
NOW

**Timeframe Technology Maturity:**
Evolving in responses to new Processors

**Benefits to LWS Applications Areas:**
ALL

**Benefiting Mission(s):**
ALL LWS missions

### Flight Requirements: *(If known)*

- **Orbit:** Flexible
- **Altitude:**
- **Inclination:**
- **Power:** 10 W
- **Weight (kg):** Few kg. (2 boards)
- **Size (cm):**
- **Telemetry:**
- **Environment Measurement:**

**Name:** Kent Wood

**Phone:** 202-767-2506

**Email:**

**Organization:** NRL Code 7621