

# Drive-by Science

*A series of quick activities for informal science events*



## UV-Sensitive Beads


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The Sun in extreme ultraviolet light

### Introduction:

Participants experiment with ultraviolet (UV) light-sensitive plastic beads, which are generally white but turns colors when exposed to UV light.

<p><u>Materials Needed:</u></p> <ul style="list-style-type: none"> <li>• 5 UV-sensitive beads per participant</li> <li>• 1 pipe cleaner per participant</li> <li>• UV (“black”) light if Sun is not available</li> <li>• Materials such as water, sunscreen, sunglasses, cap, fabric, orange pill bottles, etc. for experimentation (<i>see worksheet</i>)</li> </ul>		<p><u>Activity Time:</u> ~10 minutes</p> <p><u>Age Group:</u> 7 - adult<sup>1</sup></p>
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### Background:

These beads contain a special chemical that changes color when exposed to ultraviolet (UV) light. UV is an invisible type of light from the Sun that can burn our skin, damage our eyes, and destroy our cells. Most UV is blocked by our Earth’s ozone layer and atmosphere. But some still gets through and can be detected. The beads will stay white when inside or not exposed to UV. Incandescent and fluorescent lights will not affect them. They will only turn bright colors when exposed to UV, usually from the Sun or a UV (“black”) light. The darker the color, the more UV is present. Once you bring the beads back indoors, they will (slowly) return to white again.

<sup>1</sup> The beads are attractive to younger children, however it is difficult for them to understand the concept of invisible light. *The beads should NOT be given to children under 3 because of the possibility of choking.*

## Obtaining Beads:

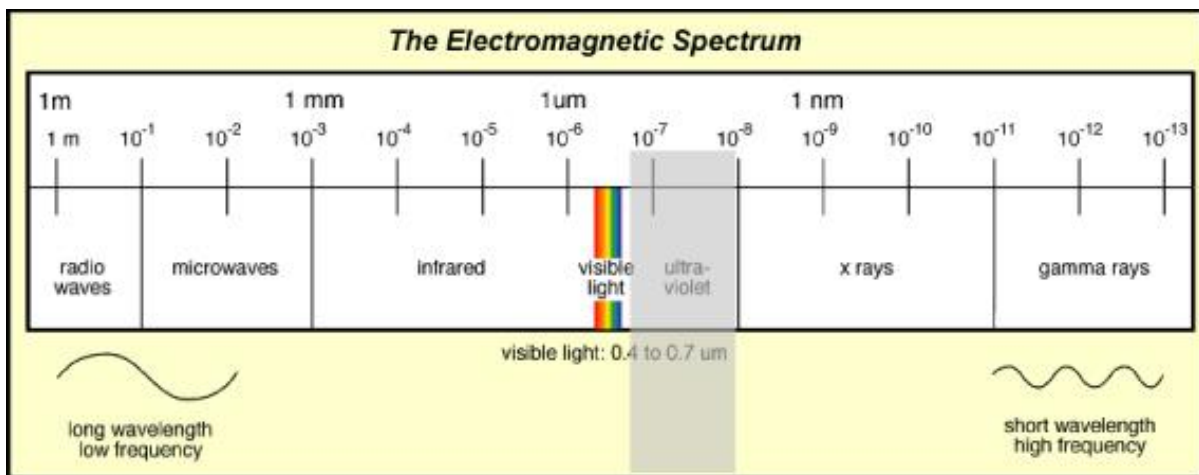
UV beads can be obtained from: **Educational Innovations™** and similar supply places:  
<http://www.teachersource.com/product/ultraviolet-detecting-beads/light-color>

## Process:

1. Give each participant:
  - 5 beads
  - 1 pipe cleaner



2. Paraphrase the background description above and show participants the electromagnetic spectrum chart. Point out that ultraviolet (UV) light is a form of energy/light, is invisible (i.e. cannot be detected by our eyes) but can be detected by a special chemical element in the beads.

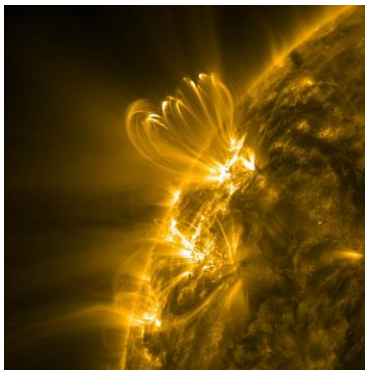


3. Have participants string their beads onto the pipe cleaner and twist or tie the ends together.
4. Now, **ask participants to be the scientist and experiment with their beads!** Either print out the “You be the scientist!” sheet or ask them determine which materials keep the beads, and hence themselves, safe from dangerous UV, and which don’t. Have them test their beads with the various items on the list below – do they look white, faint, or colored? Can they think of other items to test? If you wish, tally results on a white board or flip chart.

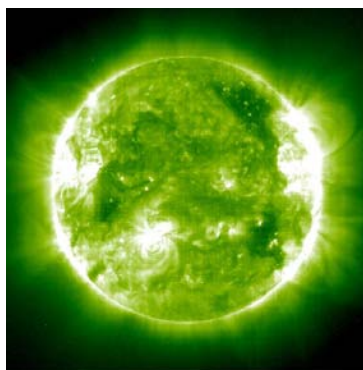
### You be the scientist!

	<b>Your prediction</b> (Do you think the beads will be white, faint, or colored?)	<b>Actual Color of Beads</b> (white, faint, or colored)	<b>Safe from UV?</b>
<b>Under water</b>			
<b>Sunlight</b>			
<b>Using sunscreen</b>			
<b>Cloudy day</b>			
<b>Behind paper</b>			
<b>Behind sun glasses</b>			
<b>Behind eye glasses</b>			
<b>Inside plastic orange medication bottle</b>			
<b>Under the bill of a cap</b>			
<b>Under cloth</b>			
<b>Behind glass or plastic</b>			
<b>Behind car windshield</b>			
<b>In shade</b>			
<b>Sun at noon</b>			
<b>Sun at sunset or sunrise</b>			
<b>UV (“black”) light</b>			
<b>Fluorescent light</b>			
<b>Incandescent or LED light</b>			

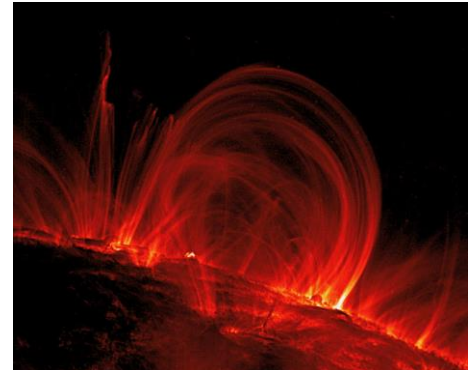
### The Sun in UV light



NASA/SDO AIA instrument



ESA/NASA/SOHO



NASA TRACE mission

All images are artificially colored since the human eye cannot see ultraviolet light.