# TPT *WebSights* column draft for May 2024:

*WebSights* features announcements and reviews of select sites of interest to learners and teachers of introductory physics. This column is available as a web page at [PhysicsEd.BuffaloState.Edu/pubs/WebSights/](http://PhysicsEd.BuffaloState.Edu/pubs/WebSights/).

If you have successfully used a physics website that you feel is appropriate for *WebSights*, please email me the URL and describe how you use it to teach or learn physics. macisadl@buffalostate.edu.

**Visualizing Energy Website: Visualizing energy transitions**

[visualizingenergy.org/](https://visualizingenergy.org/)

[www.bu.edu/igs/](http://www.bu.edu/igs/)

[tinyurl.com/WS-RecommWIreactor](https://tinyurl.com/WS-RecommWIreactor)

Professor Cleveland writes: “I am the founder and co-leader of a new project called [Visualizing Energy](https://visualizingenergy.org/) at the Boston University [Institute for Global Sustainability](https://www.bu.edu/igs/). We are an open-access science communication project that aims to increase actionable knowledge about a sustainable and just energy transition. We intend to support teaching, learning, and professional development surrounding sustainable energy and science communication. The visualizations are easily downloaded or embedded in any website, and all content is free via a Creative Commons license.”

[Ed: I enjoyed the upbeat take on many success stories of scientific, economic and political innovations, and especially enjoyed reading about carbon taxes, currently a political bunfest in Canada. Many good things are happening, and we need to get the word out, stay positive, keep pressure on and fight the good fight.

*Submitted by Cutler Cleveland, Associate Director of Institute for Global Sustainability, Boston Univ.*

**“Optics Puzzles:” 3b1b Models and Animates Light Propagating Through Media**

[www.3blue1brown.com/](http://www.3blue1brown.com/)

[en.wikipedia.org/wiki/3Blue1Brown](https://en.wikipedia.org/wiki/3Blue1Brown)

[tinyurl.com/WS-3b1bPrism](https://tinyurl.com/WS-3b1bPrism)

[tinyurl.com/WS-3b1bprism2](https://tinyurl.com/WS-3b1bprism2)

[www.walter-fendt.de/html5/phen/refractionhuygens\_en.htm](http://www.walter-fendt.de/html5/phen/refractionhuygens_en.htm)

www.youtube.com/@LookingGlassUniverse/videos

[tinyurl.com/WS-LGUn](https://tinyurl.com/WS-LGUn)

Expert mathematics animator and pedagogue Grant Sanderson has initiated an optical physics series (currently four videos) on his award-winning YouTube channel 3Blue1Brown (3b1b). This is one of my favorite sites for learning mathematics and extending mathematical insights via visualization, and Grant does not disappoint with his third optical video “Understanding prisms requires understanding springs.” This video provides extended animation and mathematical discussion of the key issue of why different frequencies of light travel at different speeds in media of different refractive indices. Sanderson discusses incident light wave driven excitation and induced radiation by the material, summing the two oscillations and then including the impact of resonant oscillation amplitudes. This video is followed by a supplementary video “Answering refractive index questions from viewers” which uses frequency selective resonance modifying propagation speed to replicates Huygen’s refraction angle reasoning, birefringence, circular polarization, and refractive indices less than 1 (producing phase velocity travelling faster than the speed of light yet not violating causality). Sanderson closes the “questions” video with a shout out to another YouTube channel “Looking Glass Universe” by Mithana Yoganathan largely dedicated to QM (including home experiments), but including several videos on light propagation through media.

For my non-calculus students I also like Walter Fendt’s Huygens Principle applet for this for introducing this topic, this portrays the effect of slowing any single frequency across a boundary and reproduces Snell’s Law nicely, without getting at a satisfactory “why”or showing the effect of varying light frequency. Fendt’s applet is still an outstanding first step controllable animation for introductory students.

**Summer Professional Development Opportunities**[aapt.org/Conferences](https://aapt.org/Conferences/index.cfm)

[www.per-central.org/conferences/2024/](http://www.per-central.org/conferences/2024/)

[phystec.org/](https://phystec.org/)

[www.modelinginstruction.org/2024-workshops-by-discipline/](http://www.modelinginstruction.org/2024-workshops-by-discipline/)

[www.Perimeterinstitute.ca/professional-development](http://www.Perimeterinstitute.ca/professional-development)

The 2024 AAPT Summer Meeting is planned to meet live in Boston, MA, in July 6-10 and PERC (Physics Education Research Conference) and PhysTEC (Physics Teacher Education Coalition) will run afterwards. The AMTA (American Modeling Teachers Association; including yours truly) will run summer Modeling Physics teaching professional development workshops nationwide. The Perimeter Institute will run online summer programming. Catch some PD and have a great summer.