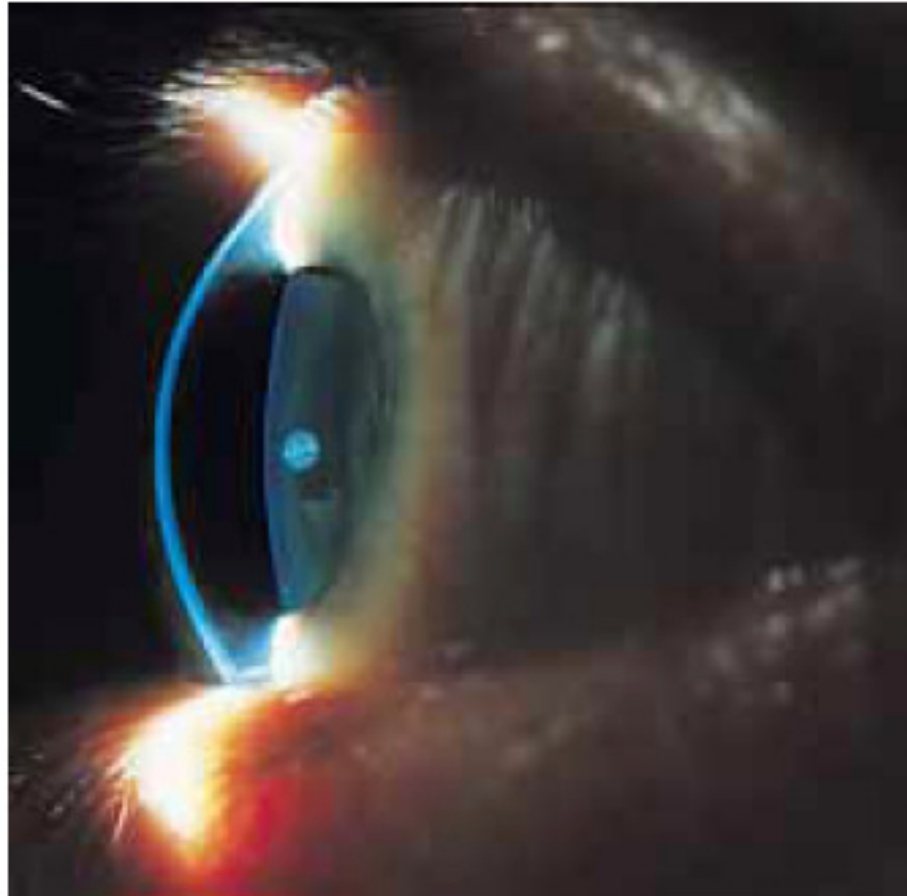
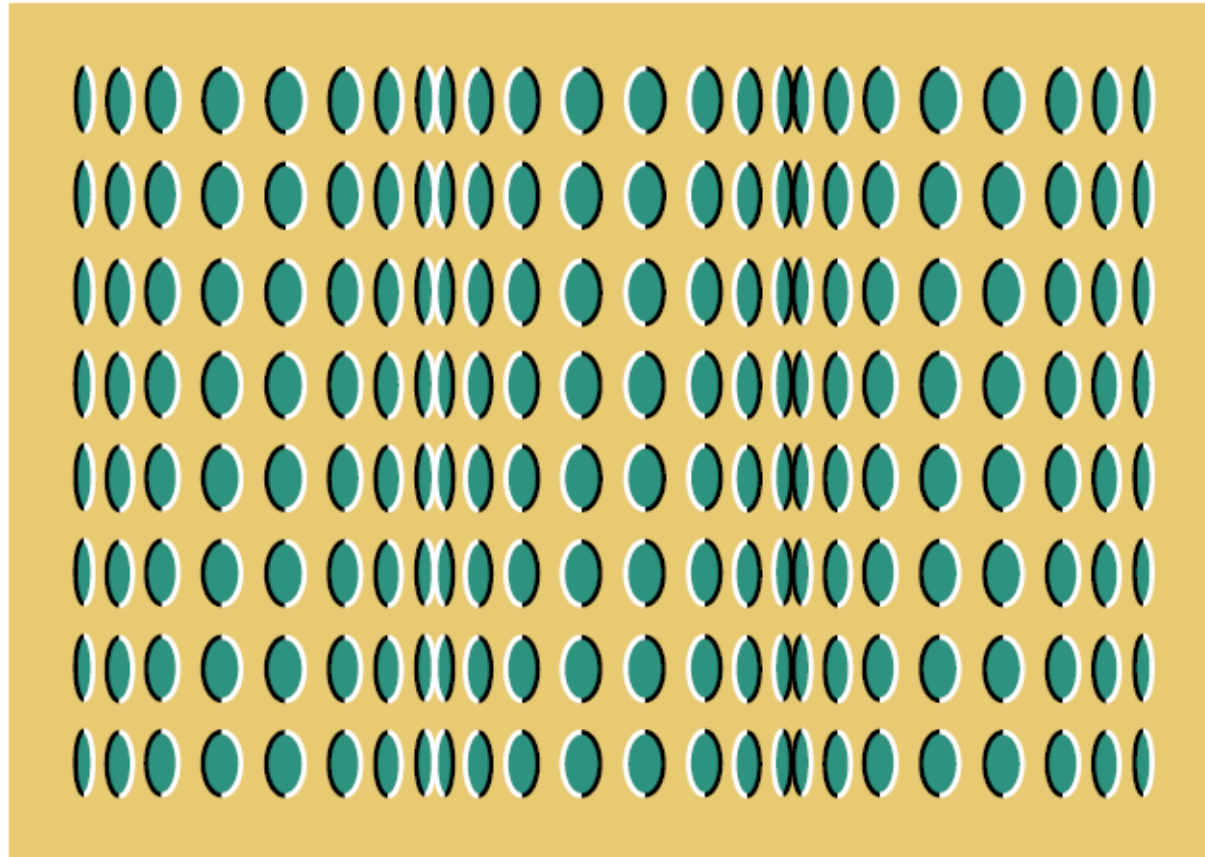


Why light is wonderful ?



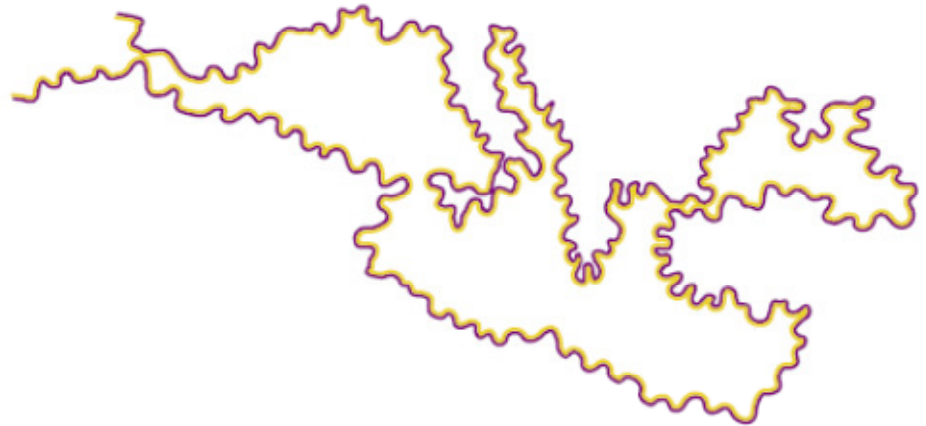
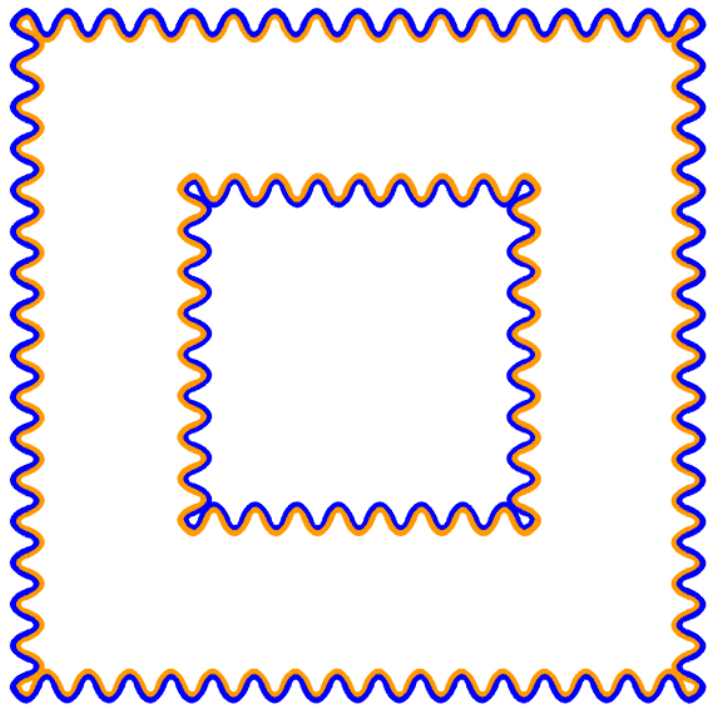
G.V. Pavan Kumar
IISER - Pune

Movement without motion



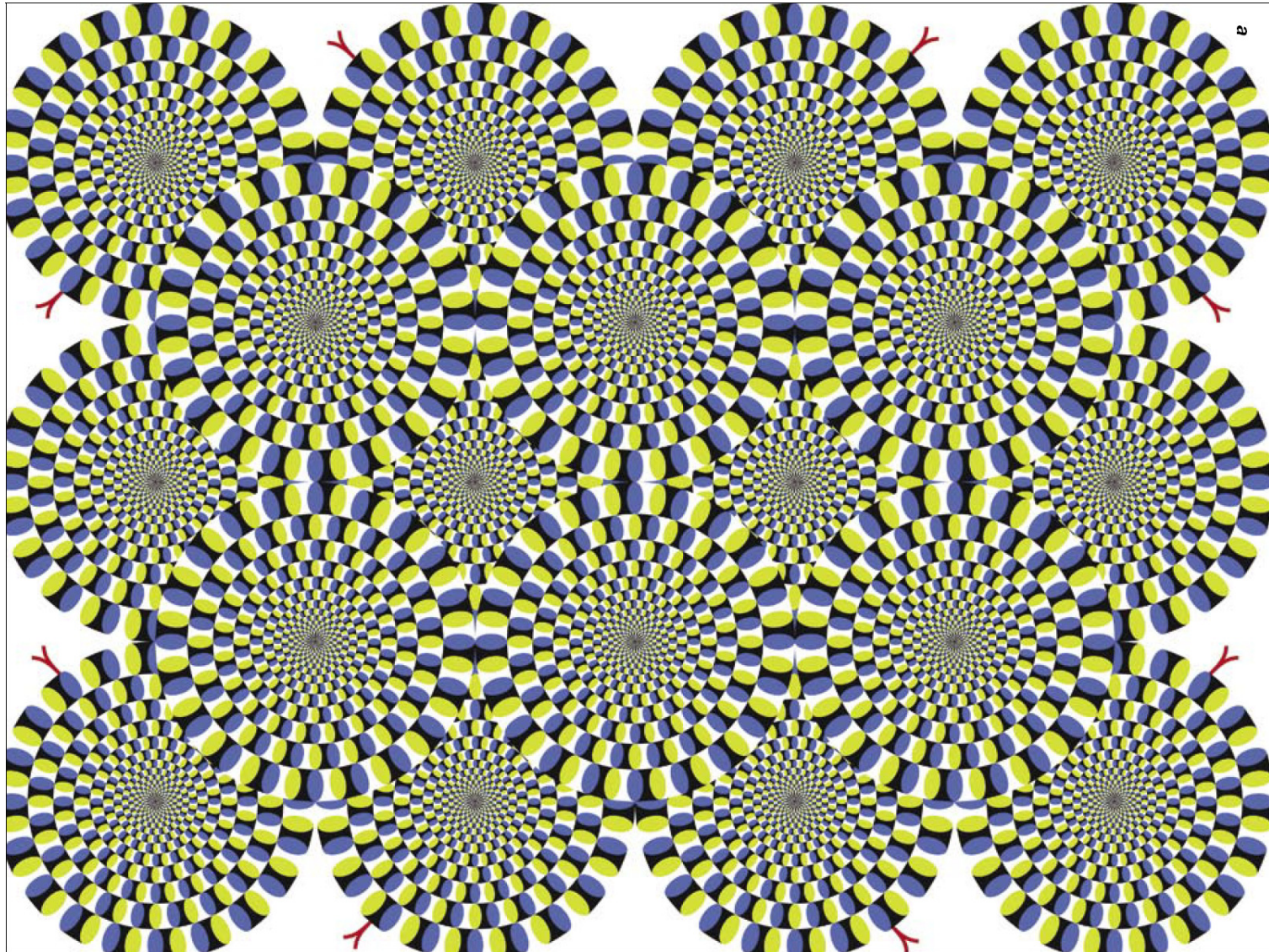
Games of eye and brain :

Watercolour effect



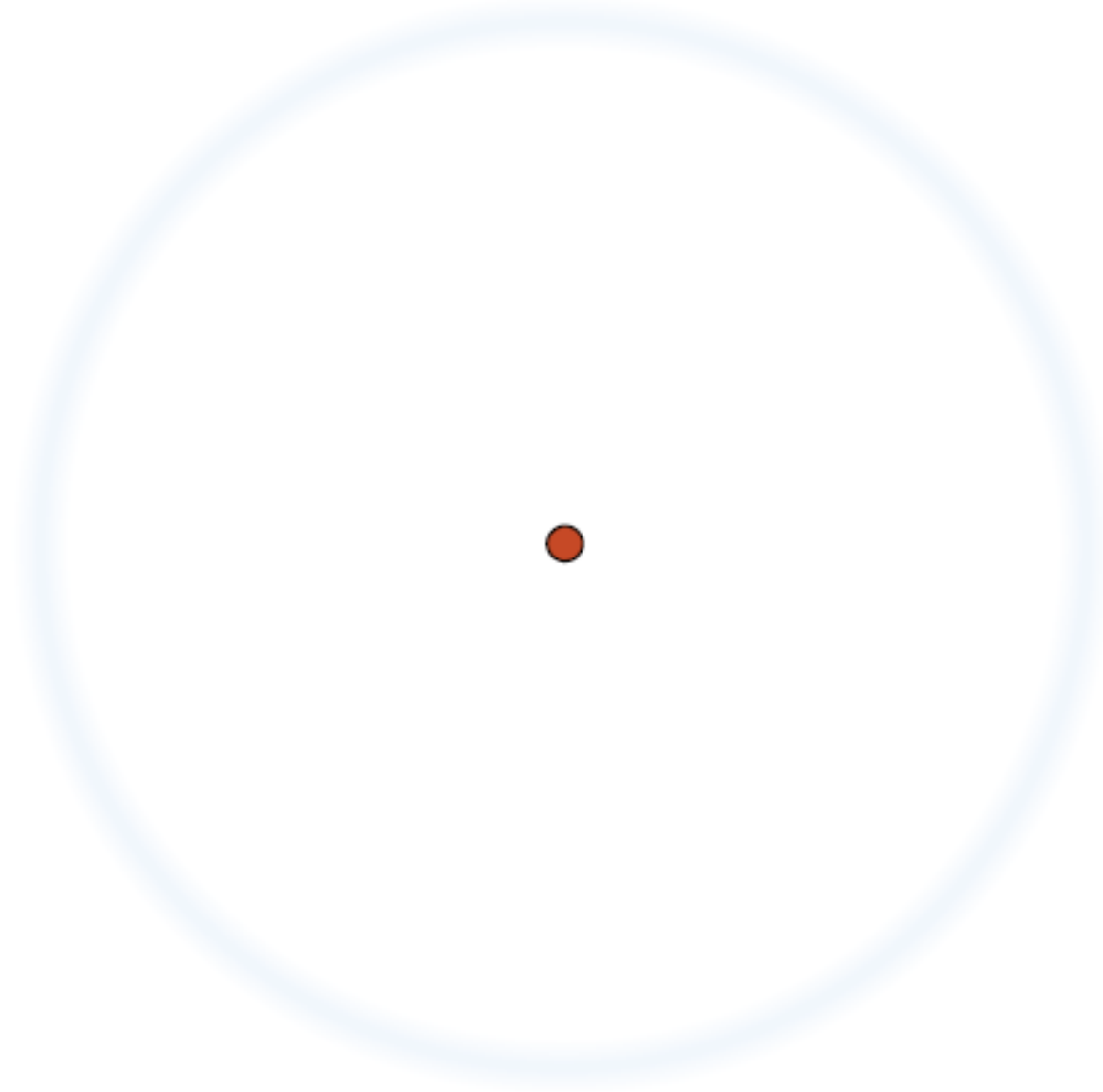
JOHN S. WERNER, BAINGIO PINNA and LOTHAR SPILLMANN
Scientific American, March 2007, page 90

Static ?????.....yet fantastic !!



VILAYANUR S. RAMACHANDRAN AND DIANE ROGERS-RAMACHANDRAN
Scientific American, March 2007, page 14

Troxler test



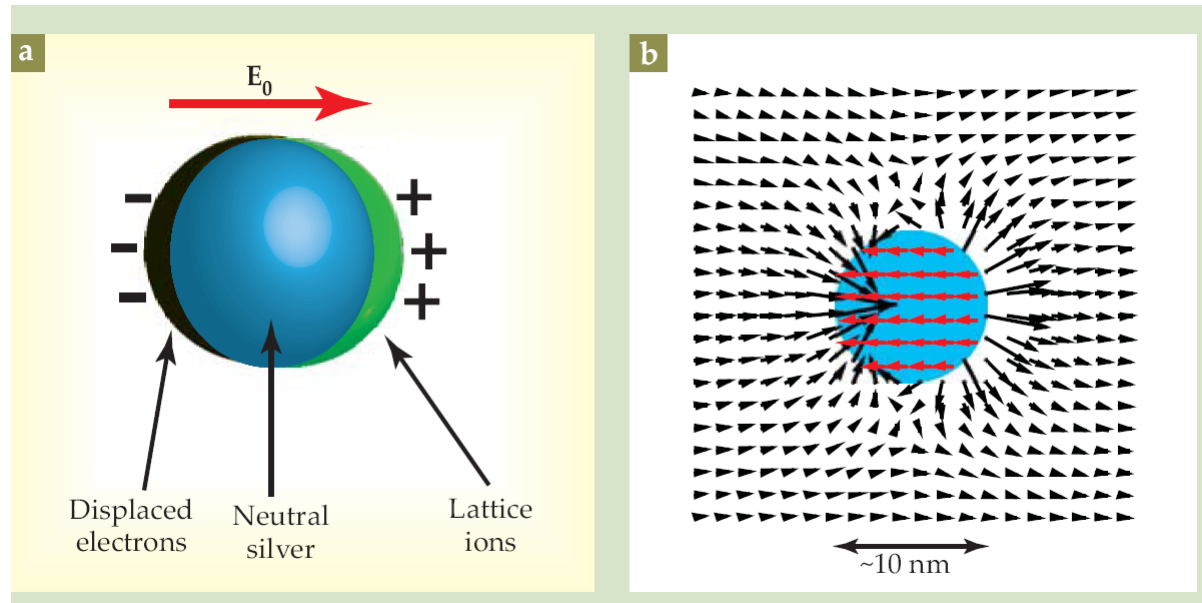
Ancient age

LYCURGUS CUP, a Roman goblet dating from the fourth century A.D., changes color because of the plasmonic excitation of metallic particles within the glass matrix. When a light source is placed inside the normally greenish goblet, it looks red.



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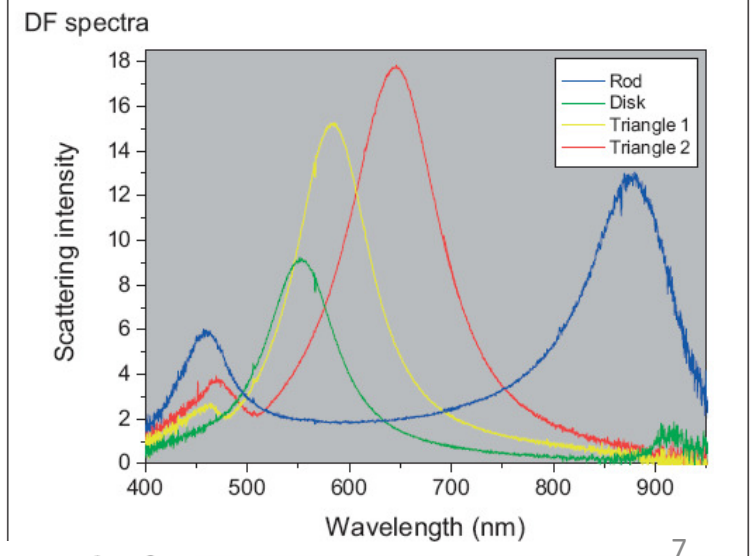
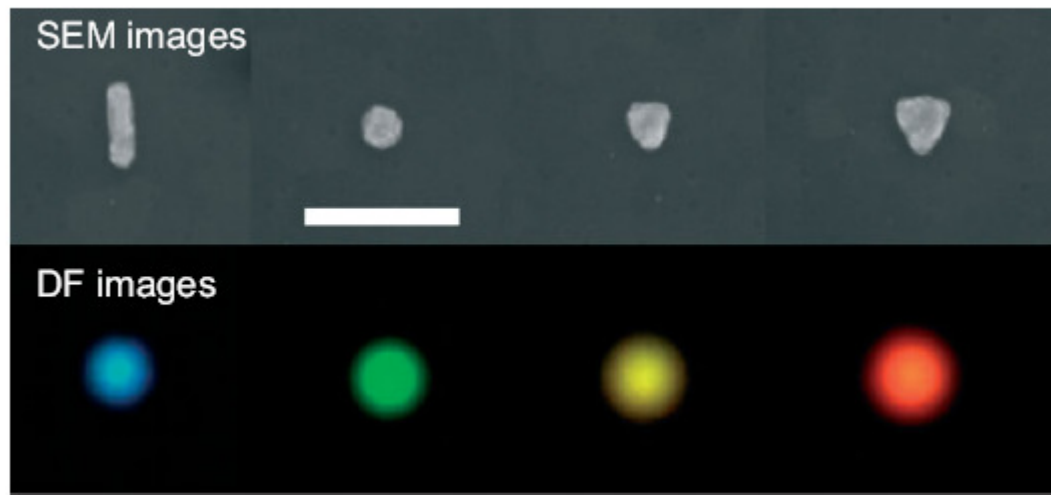
What are Plasmons ?



Stockman, **Physics Today**, page 43, Feb 2011

Shape and size dependence :

Scale bar = 300

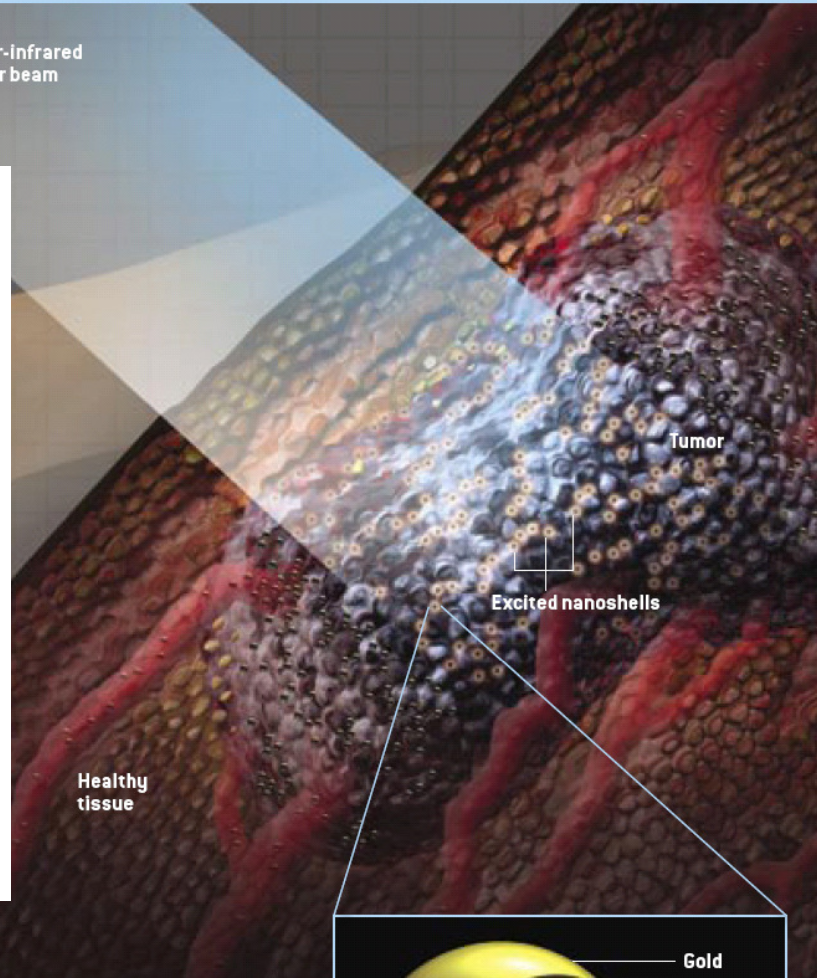


Murray and Barnes *Adv. Mater.* **2007**, 19, 3771–3782

PLASMONIC THERAPY FOR CANCER

Metal nanoparticles can be heated up by shining laser light. The laser wavelength should match with plasmon resonance

Near-infrared laser beam

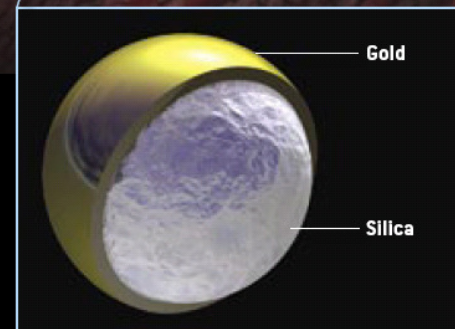


Excited nanoshells

Tumor

Healthy tissue

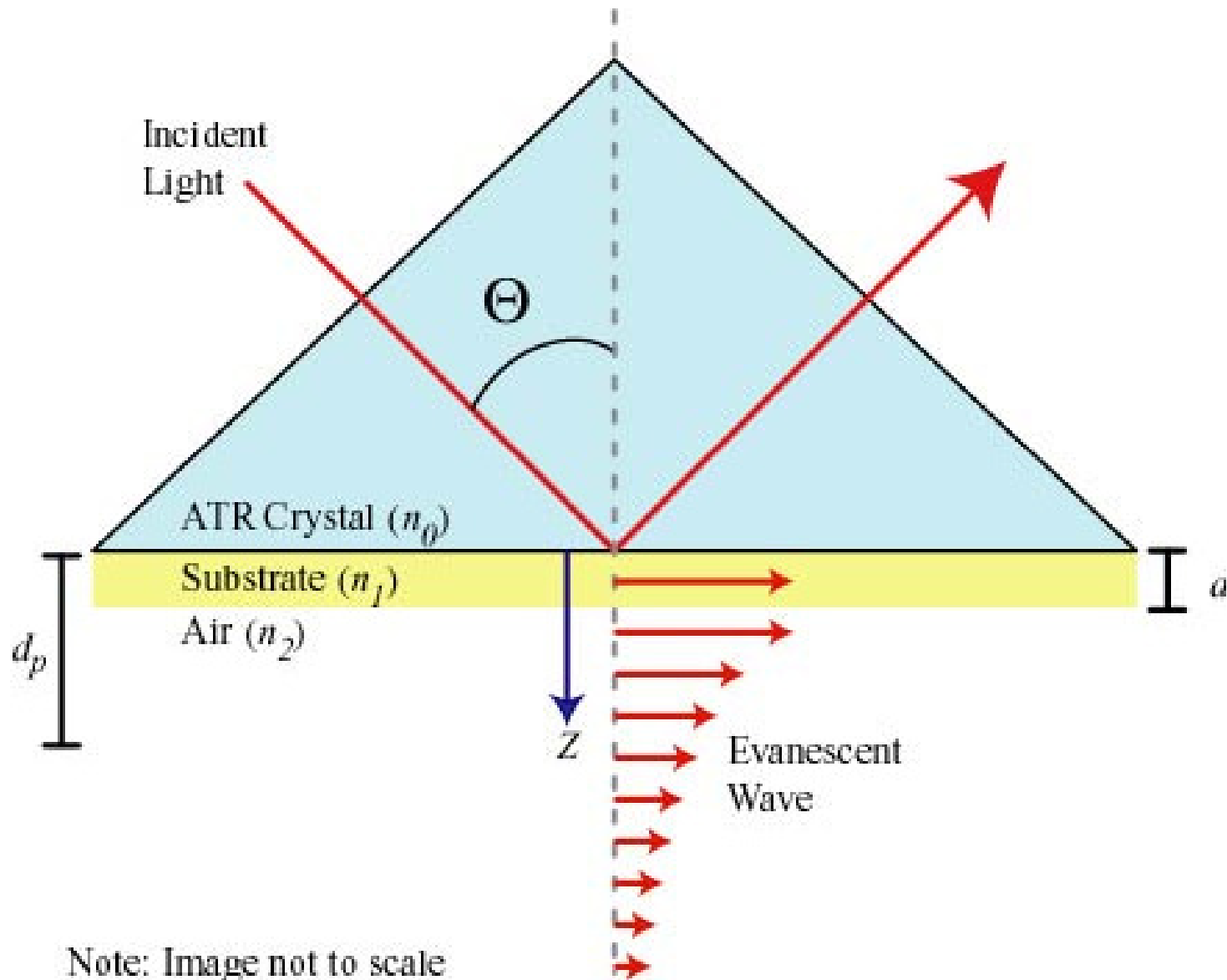
A proposed cancer treatment would employ plasmonic effects to destroy tumors. Doctors would inject nanoshells—100-nanometer-wide silica particles with an outer layer of gold (*inset*)—into the bloodstream. The nanoshells would embed themselves in a fast-growing tumor. If near-infrared laser light is pointed at the area, it would travel through the skin and induce resonant electron oscillations in the nanoshells, heating and killing tumor cells without harming the surrounding healthy tissue.



Gold

Silica

There but not there **Evanescent waves**

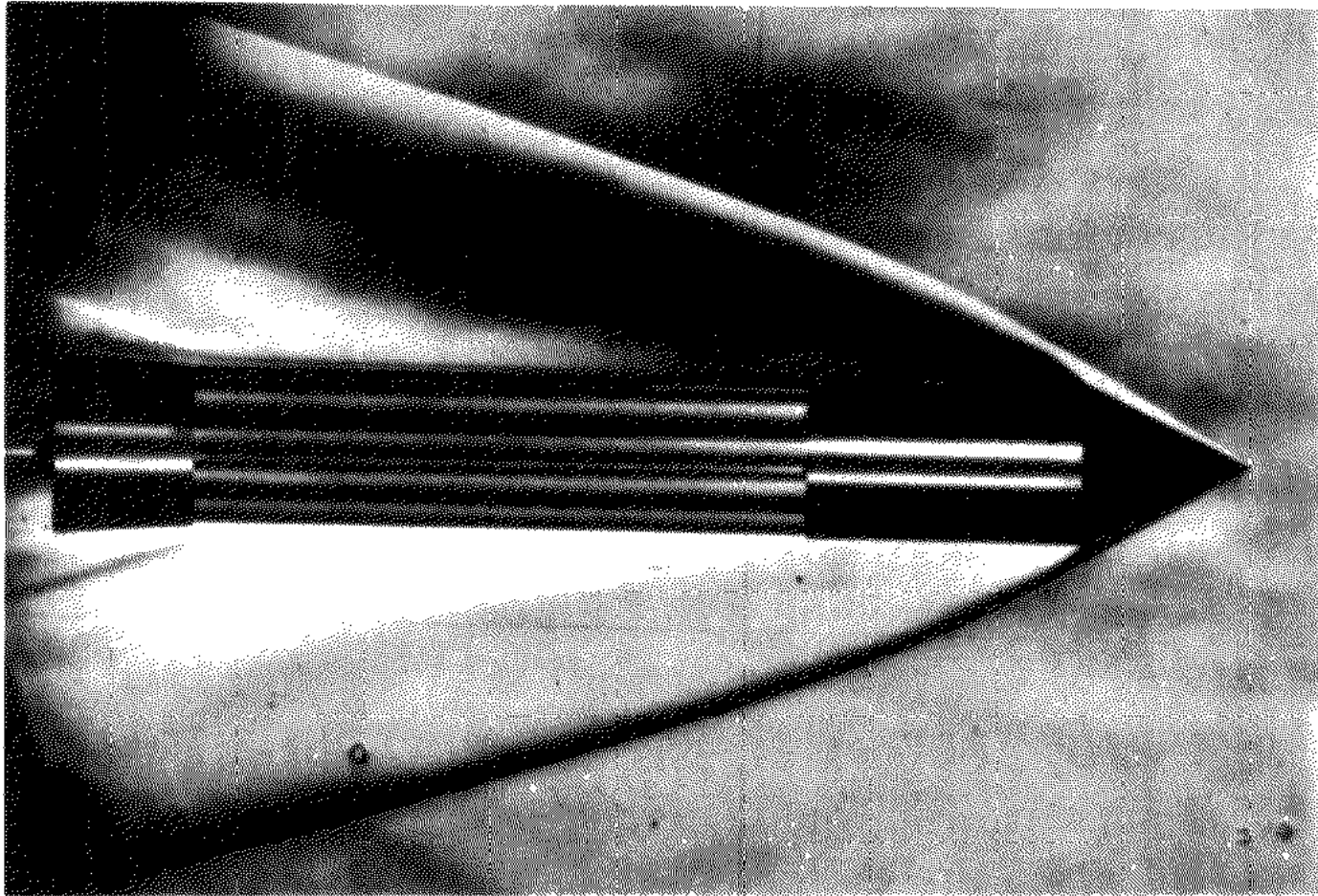


Bow waves



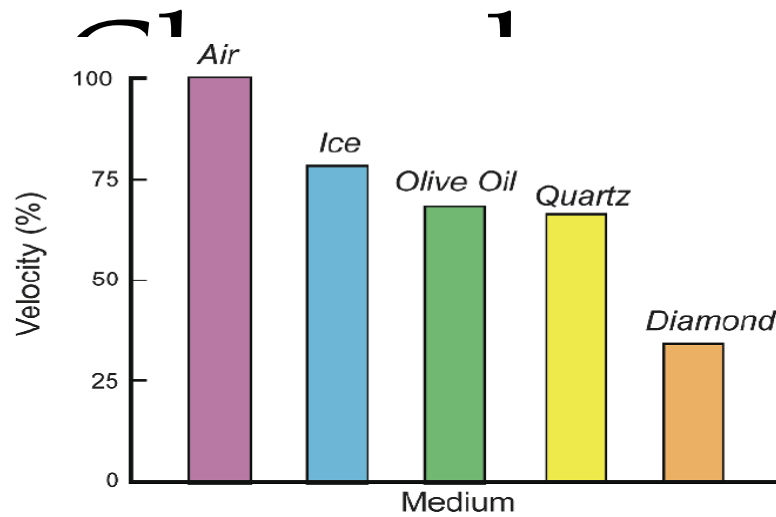
A shock wave

induced in a gas by a projectile moving faster than sound



Can something travel faster than light ?

Yes !!!!! , but in a particular medium



Effect – slow waves of light

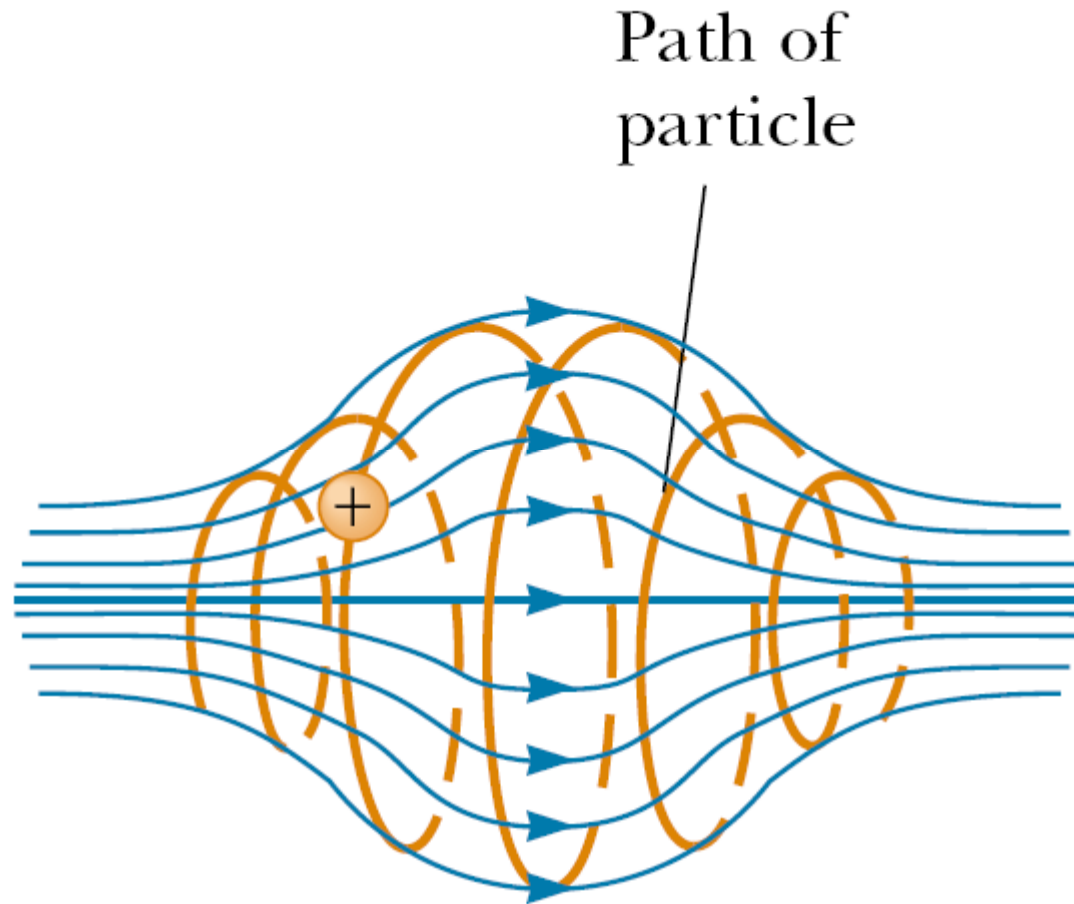
Medium	Refractive Index
Air	1.0003
Ice	1.31
Water	1.33
Olive Oil	1.47
Crown Glass	1.52
Diamond	2.42

Auroras – curtains of light

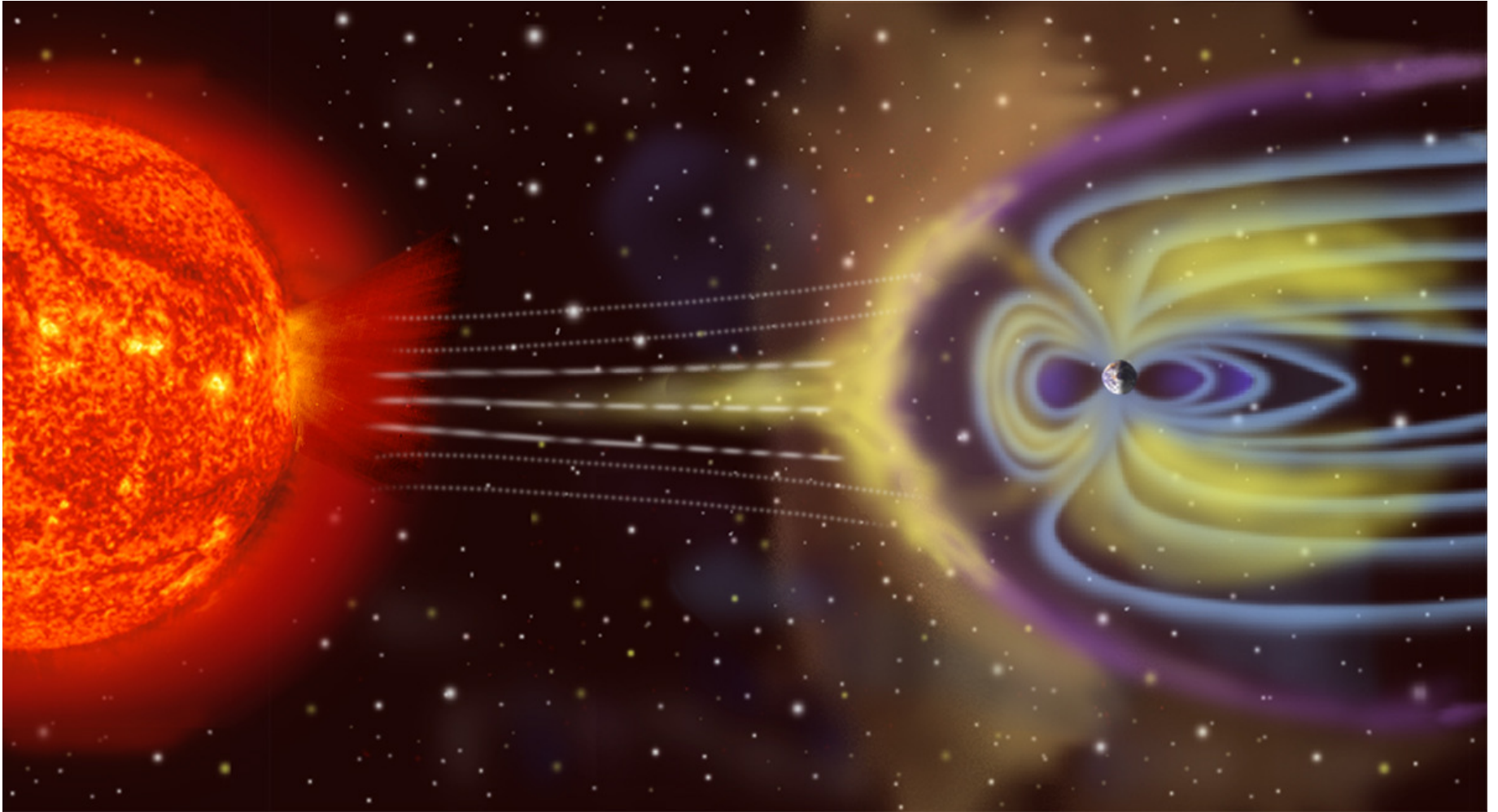


Over lake Superior

Magnetic bottles



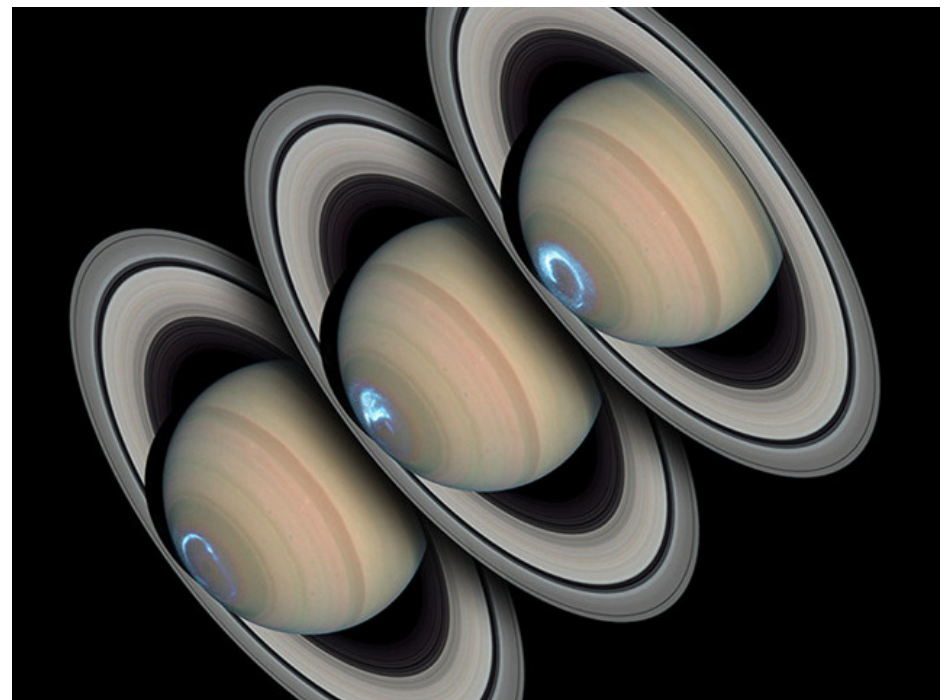
Why Auroras ?





North Dakota, USA

*Auroras on Saturn
Captured by Hubble space telescope*



Panoramic image of Aurora & a meteor



Chena Lake in North Pole, Alaska, USA

Auroras seen from space

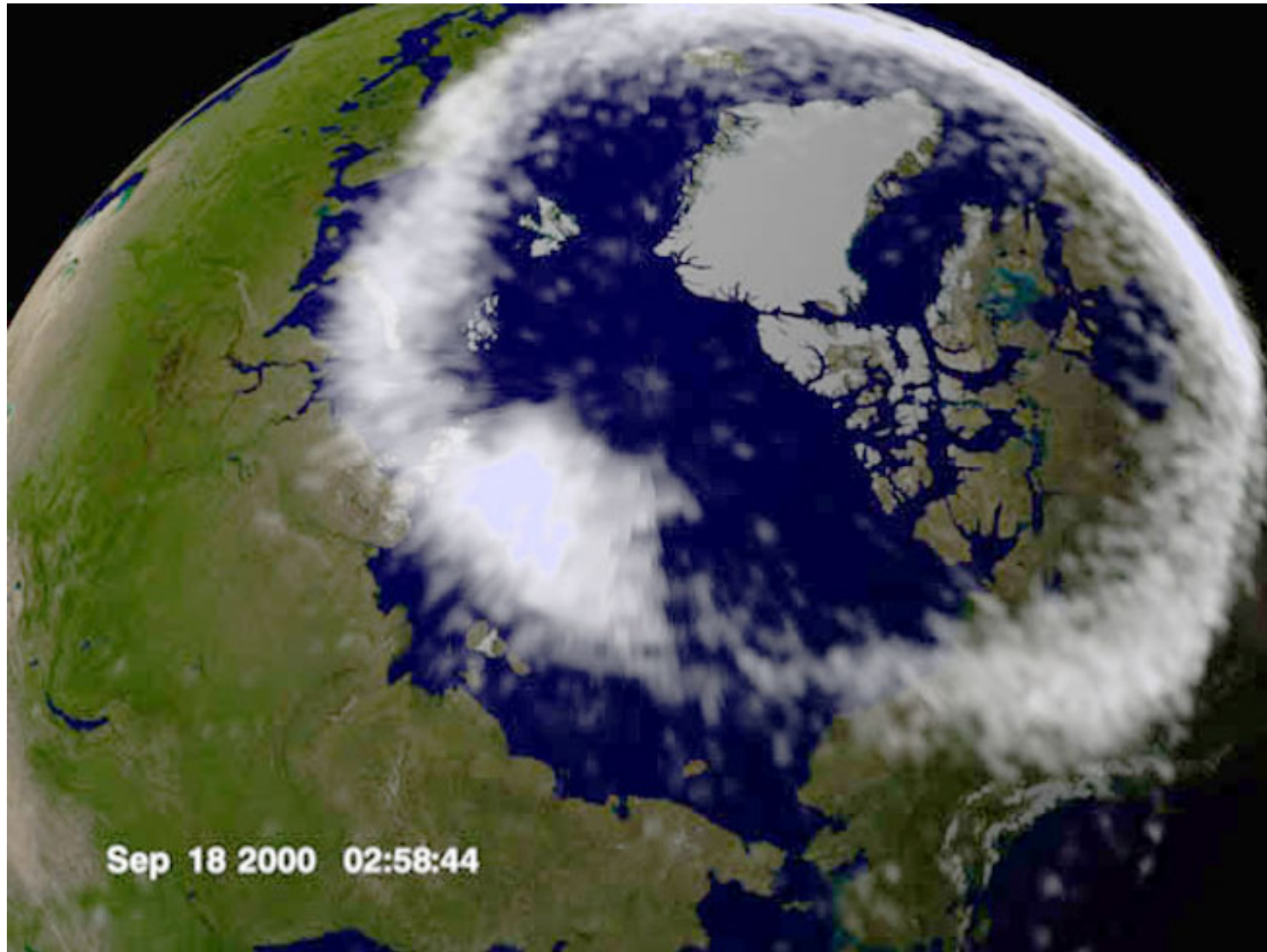


Volcano Hekla and an aurora in Iceland



© Sigurður H. Stefniðsson

Proton Aurora – A rare phenomenon

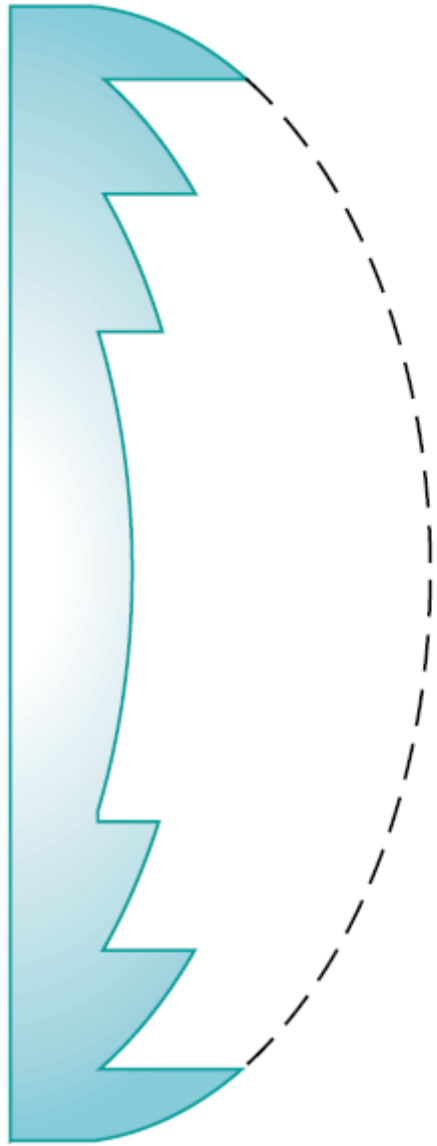


Above Earth's magnetic north pole

Headlights – lines on the surface ?



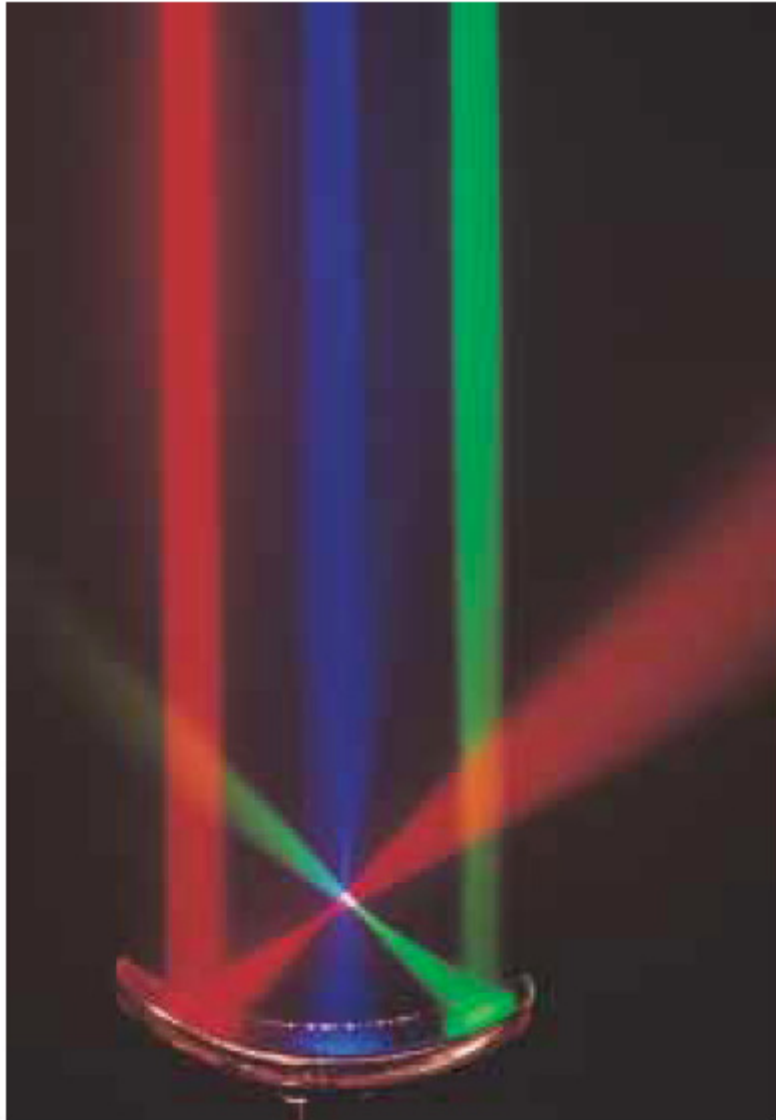
Fresnel lens



Normal lens



Concave mirror



Convex mirror



To find the universal elements enough;
to find the air and the water exhilarating;
to be refreshed by a morning coffee or an evening walk;
to be thrilled by the stars at night;
to be elated over a bird's nest or a wildflower in spring

.....these are some of the rewards of
simple yet special life.

Adapted from John Burroughs writing

Interesting Books

[Feynman Lectures in Physics](#) (all 3 volumes)

[Vignettes in Physics](#) by G. Venkataraman (12 books), University Press

[The Flying Circus of Physics](#) by J. Walker

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My science blog

<http://science-neethi.blogspot.com/>