



Science *for*
Humanity
Trust, *Inc.*



SCIENCE *for* HUMANITY *trust*

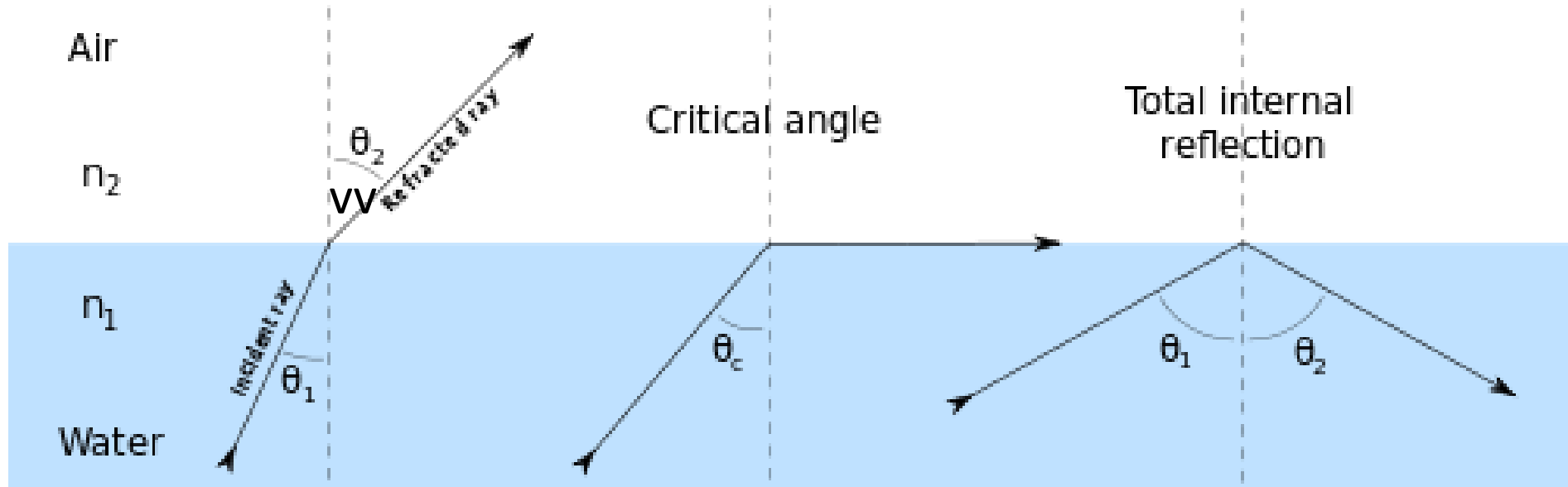
The photon to electron/positron-pair transition

A. Meulenbergh, R. F. Penland, and
W. R. Hudgins

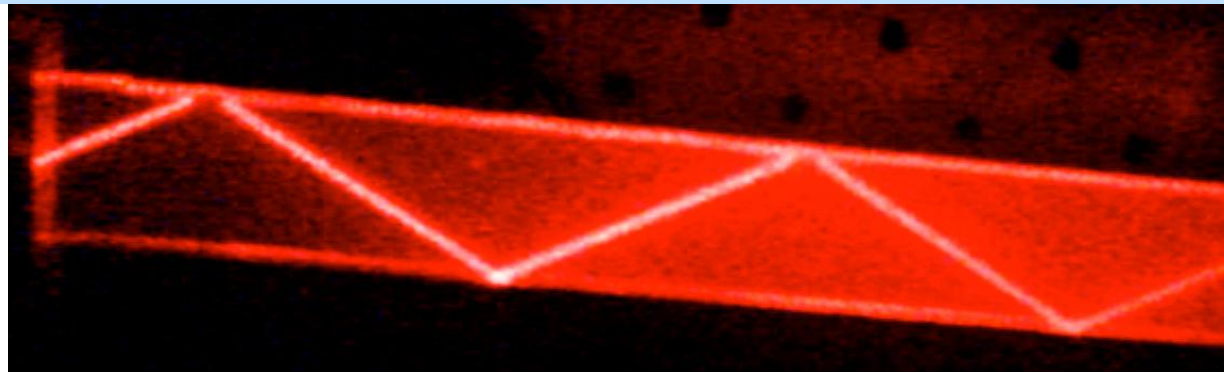
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Main Themes for Photon-to-Electron Transitions

1. Total internal reflection (TIR)
2. Light trapping
3. Evanescent waves
4. Model of photon
5. Space warping by energy density
6. Self trapping of photons
7. Resonance (Falaco solitons)
8. 'Rectification' of photons
9. Electron-positron pairs (in 4-space)
10. Minimum energy (ball of yarn)

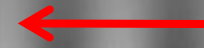


Total internal reflection
light trapping –

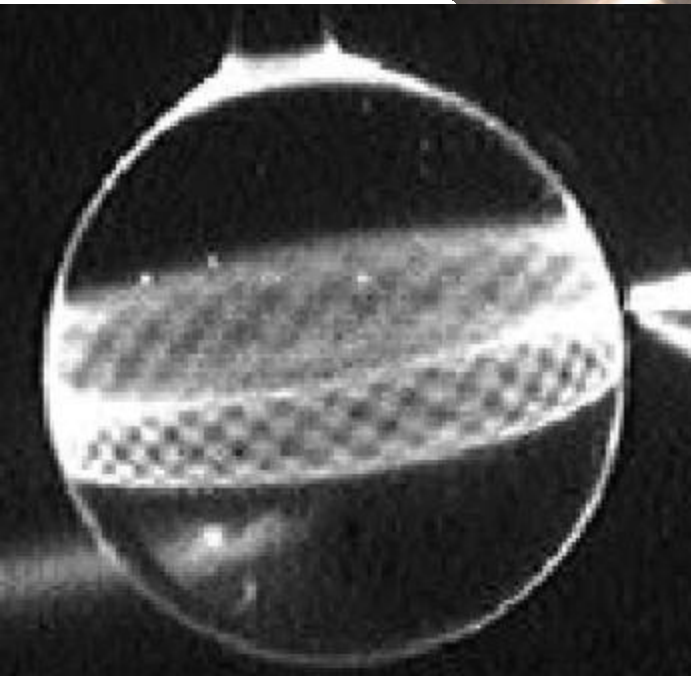
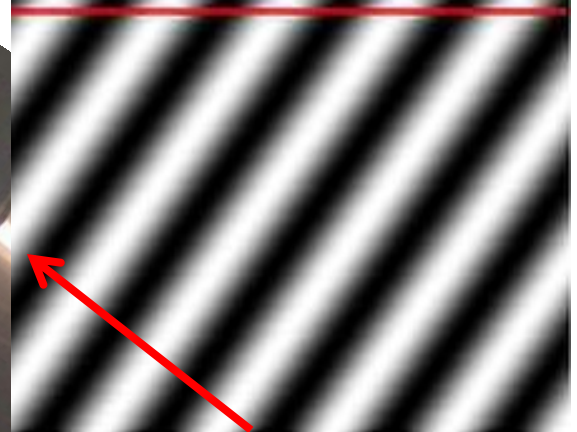
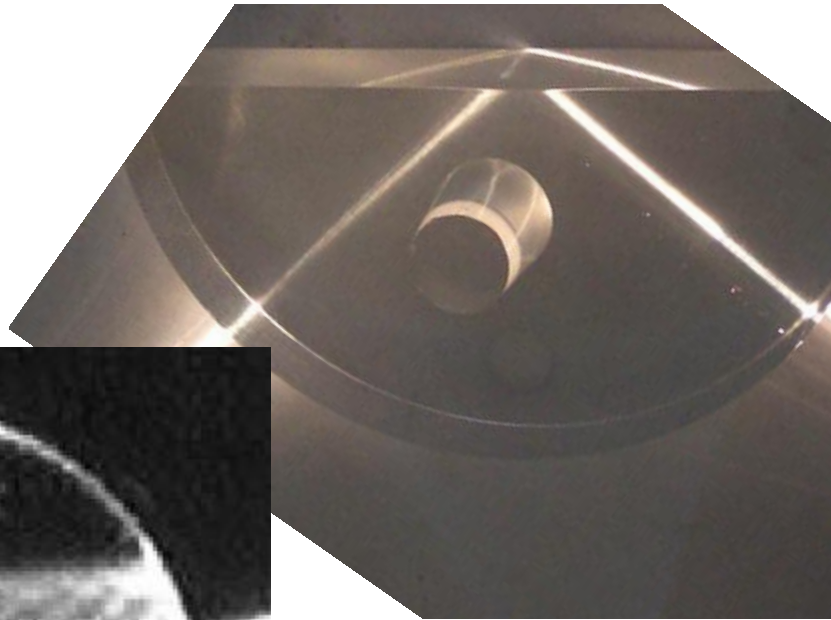


in light traveling from high index to lower

Evanescent wave



Total Internal Reflection



TIR \rightarrow Light bound in μ sphere
(note non-QM resonance)

Self Focusing of intense laser beams and fiber optics

$$n = n_0 + n_2 I$$

Non-linearity

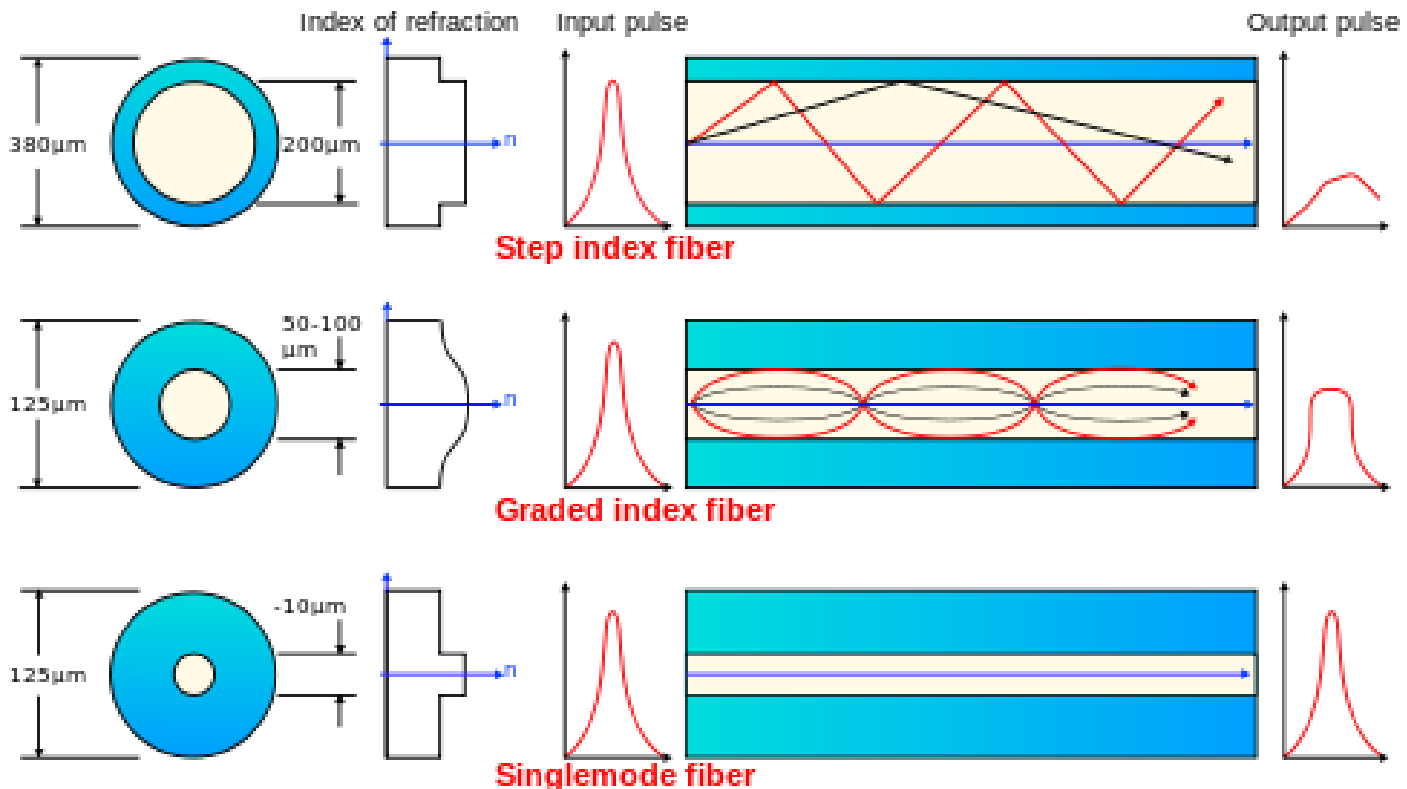
$$n = n_0 + n_2' E^2$$

Field dependence

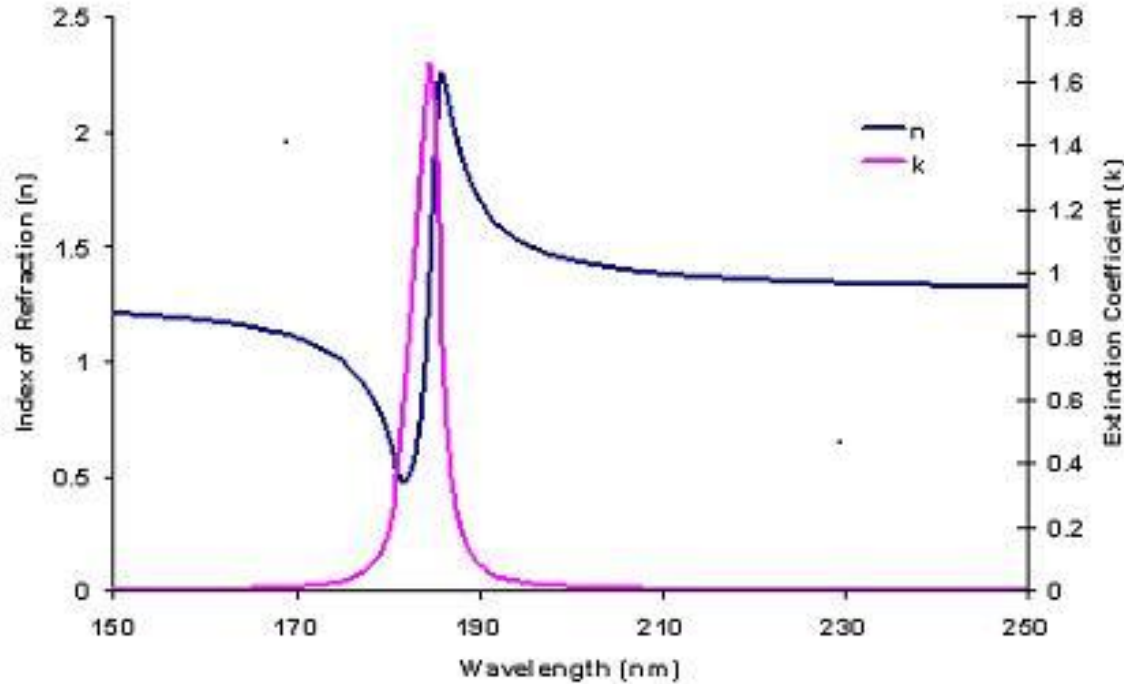
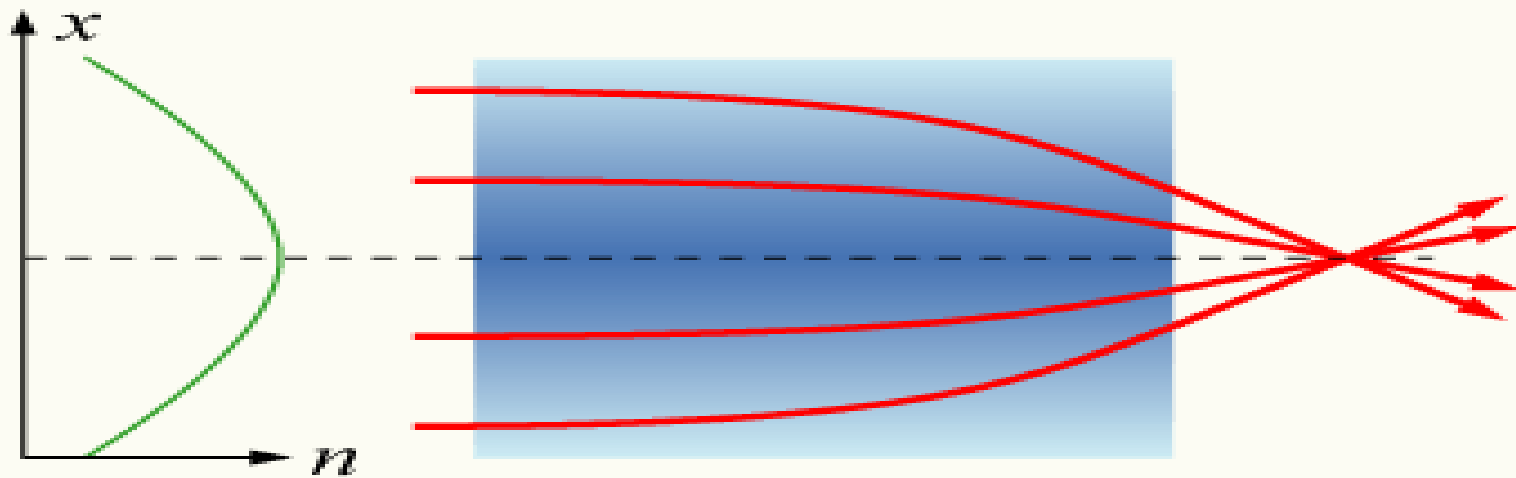
$$P_{cr} = \alpha I^2 / 4\pi n_0 n_2$$

Critical power

($P_{cr} \approx 2.4 \text{ GW/m}^2$. Photon power density $\sim 1.2 \text{ GW/m}^2$, if all of the energy were concentrated in a single cycle)



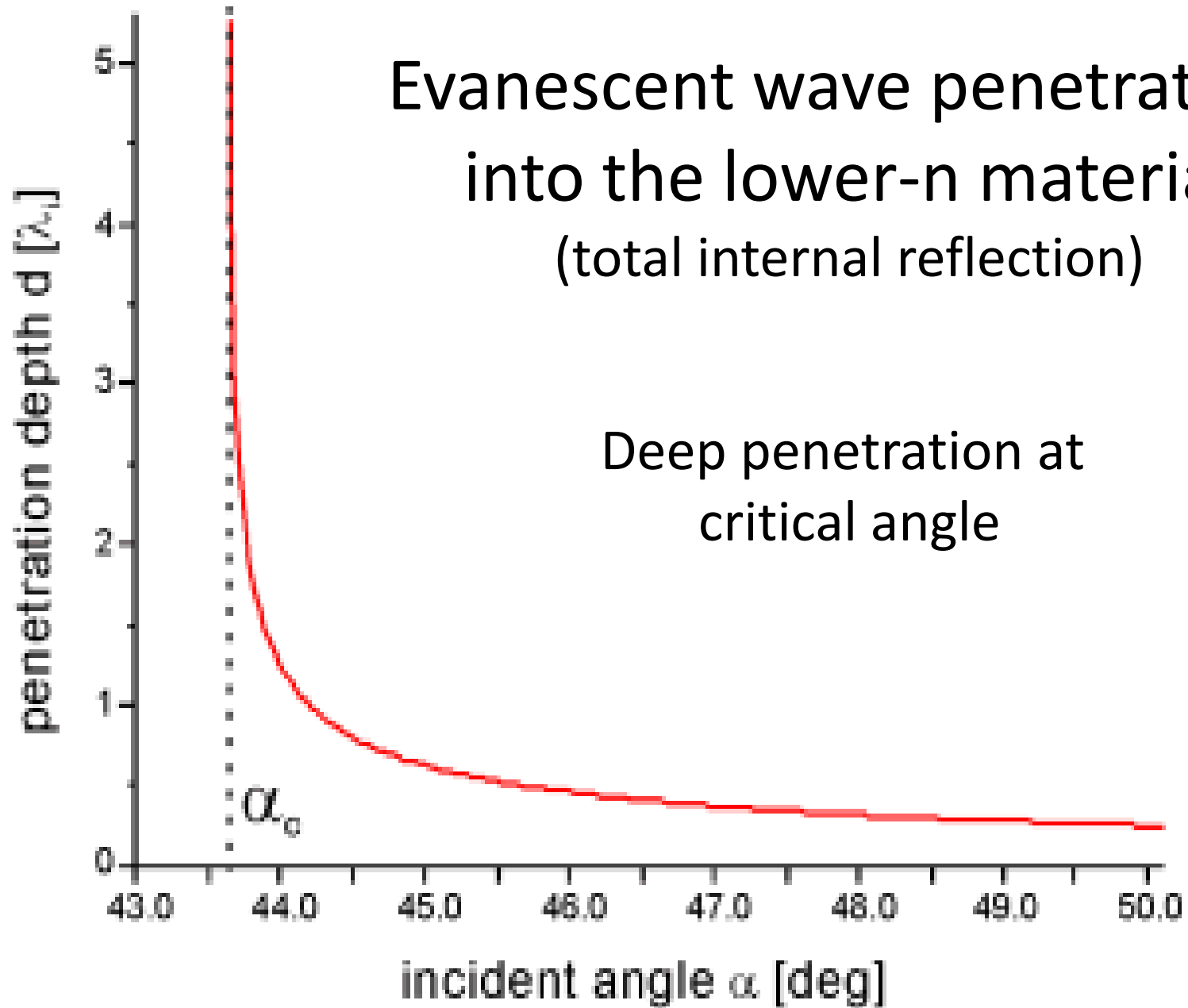
Gradient-index (GRIN) optics



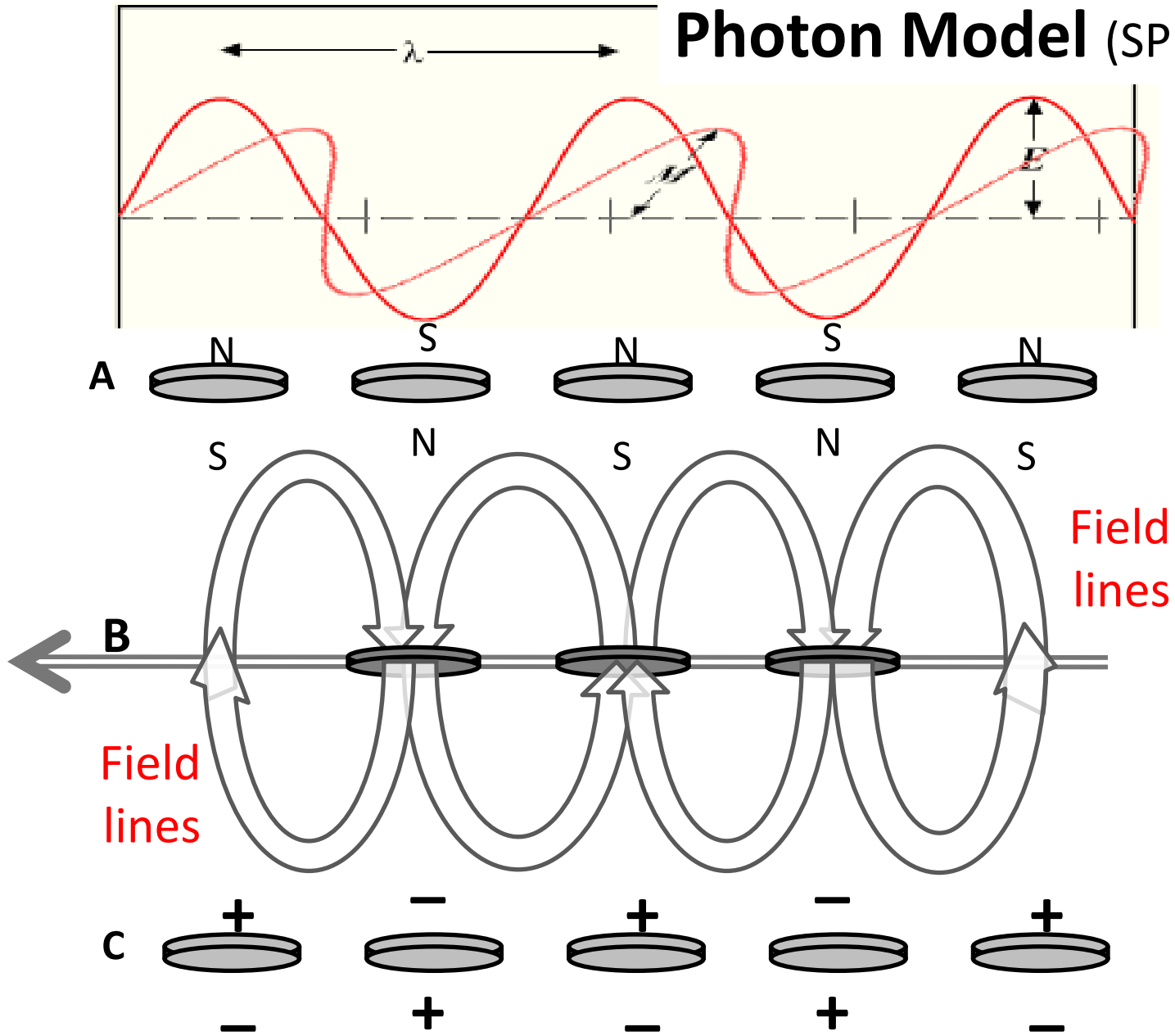
Photon is a self resonant. As such, it has anomalous dispersion.

Evanescent wave penetration into the lower-n material (total internal reflection)

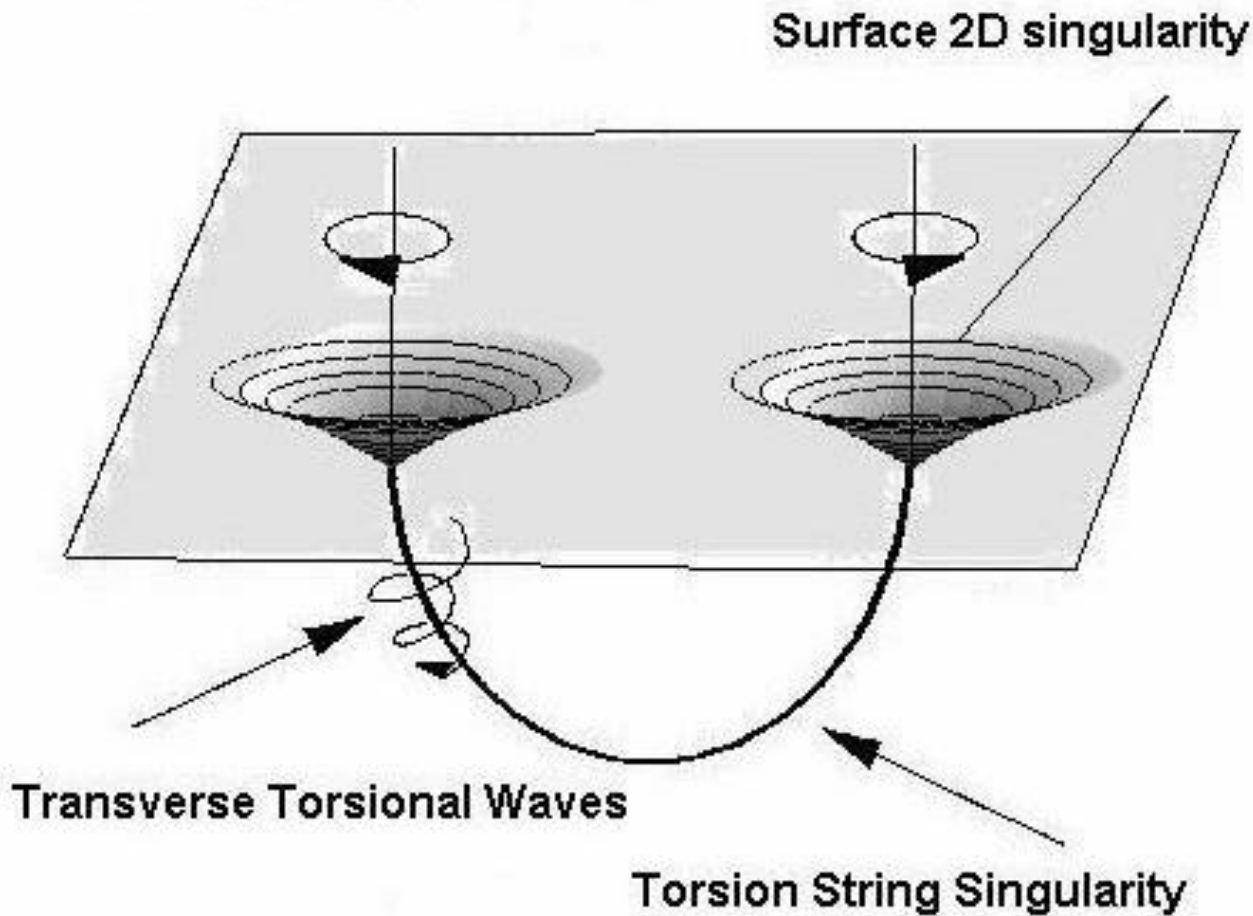
Deep penetration at
critical angle



Photon Model (SPIE 2013)



Falaco Topological Defects



Non-Equilibrium
Systems and
Irreversible Processes
Adventures in Applied
Topology Vol. 2

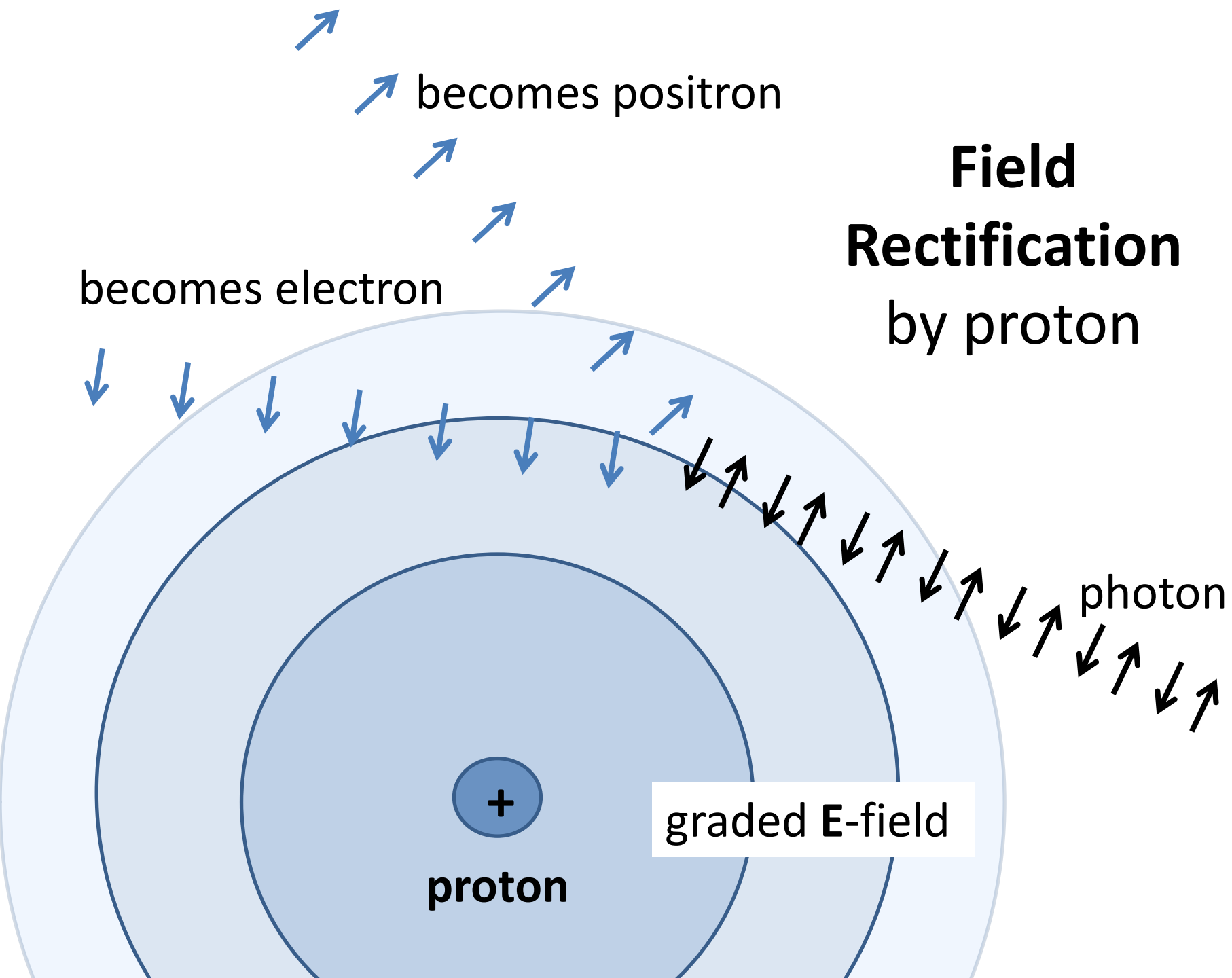
Falaco Solitons, Cosmology, and the Arrow of Time

from a Perspective of
Continuous Topological
Evolution.

R. M. Kiehn

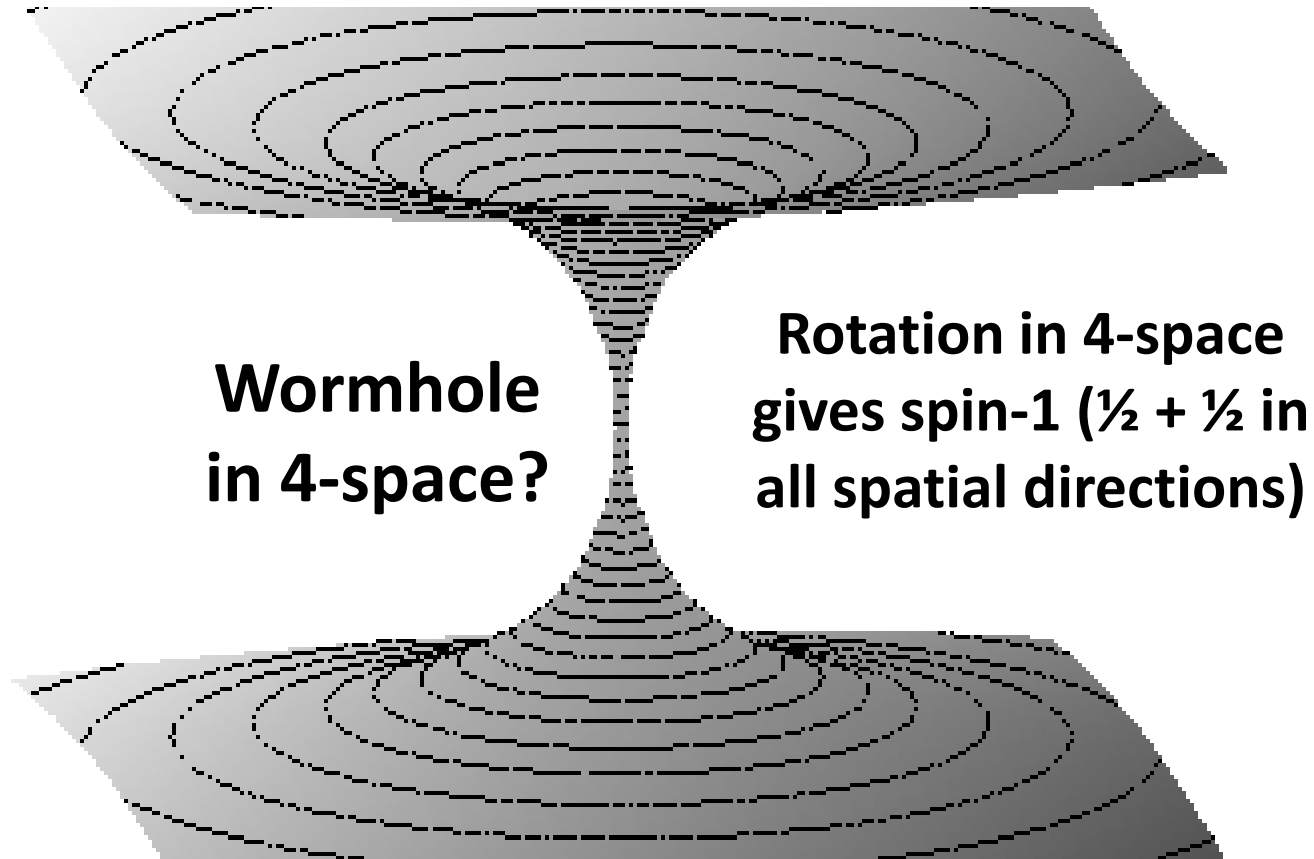
2004

Extend model to 3-D surface in 4-Space
Rotation must be around time axis to give
spherical symmetry in 3-space



Hopf Minimal surface - Falaco Soliton

Potentials in 3-space and time

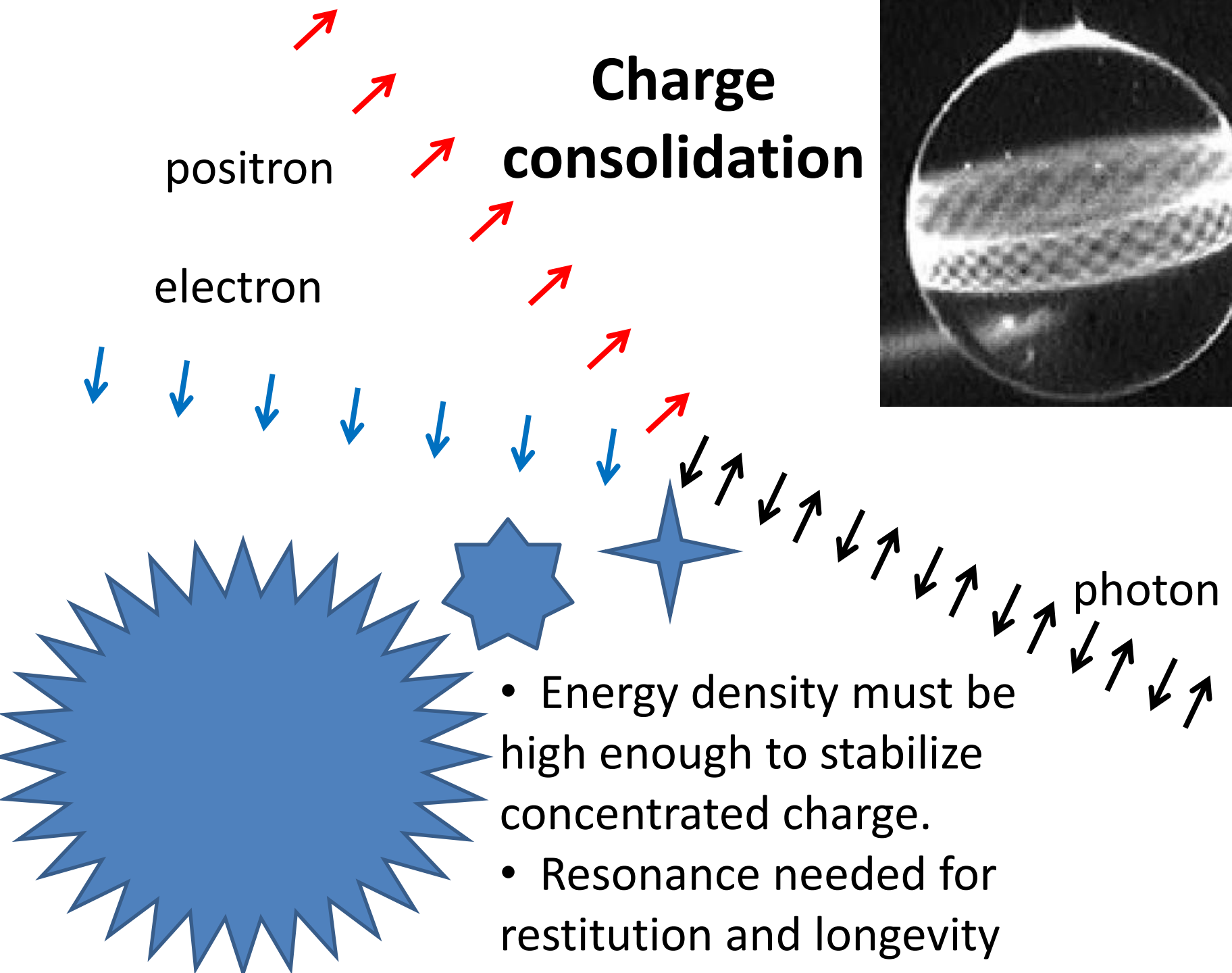
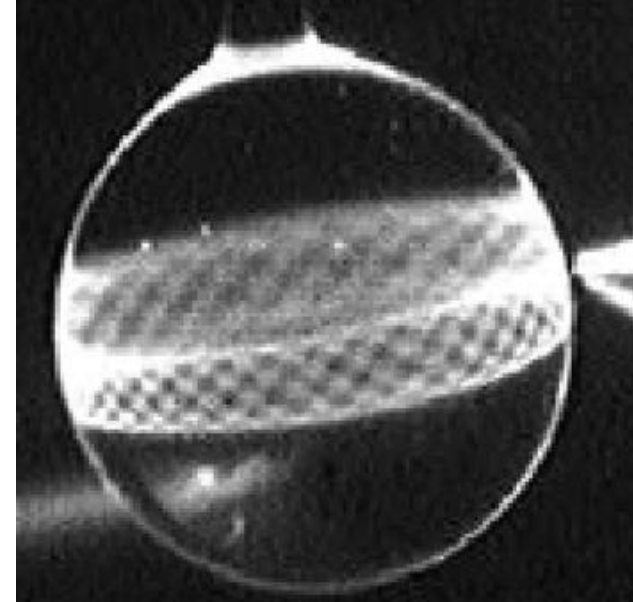


Picture an electron-positron pair!

Charge consolidation

positron

electron



- Energy density must be high enough to stabilize concentrated charge.
- Resonance needed for restitution and longevity

Linear photon to spherical leptons

- Photon of many cycles is 'wrapped' into sphere for lowest total energy
- TIR traps photon and produces evanescent wave (virtual photon = charge)
- Acceleration of electron alters its shape (orientation & 'wavelength')
- Relativistic effects will limit photon velocity
- Deviation from spherical shape (maintained by velocity) raises energy
- Inertia is result of energy changes w velocity