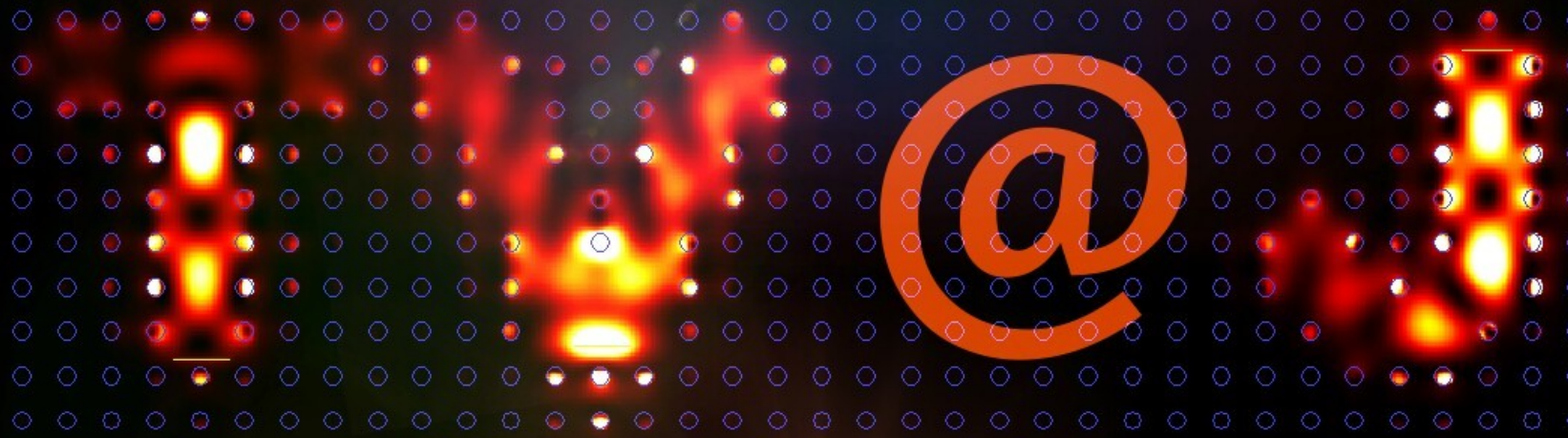
Jak se světlo šíří a resonuje v nanostrukturách



Simona Burýšková, Dominika Jurdová,
Jan Kolovecký, Miroslav Müller

O čem budeme mluvit?

- Nanotechnologie
- Použité simulační programy
- Geometrická vs vlnová optika
- Fotonické krystaly
- Metamateriály

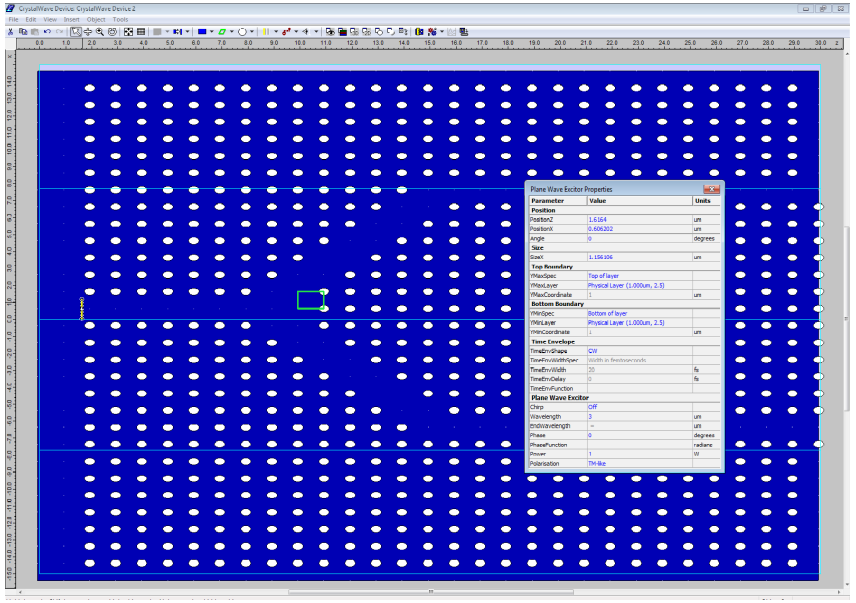
Úvod

- Nanotechnologie
- Fotonické struktury
- Jejich praktické využití
- Náš miniprojekt

Simulační programy

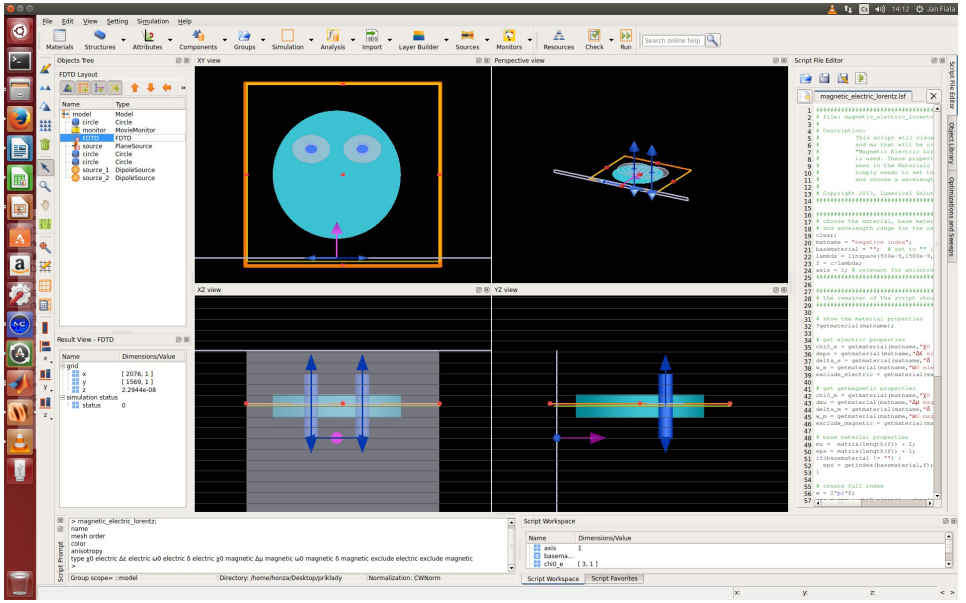
- FDTD (finite-difference time-domain)

- PhotonDesign



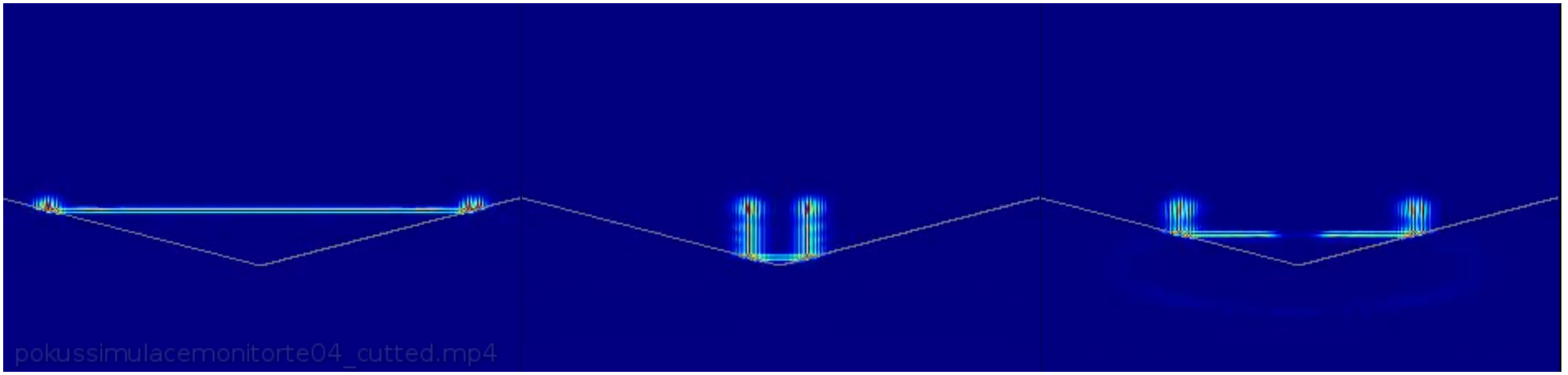
www.photond.com

- Lumerical

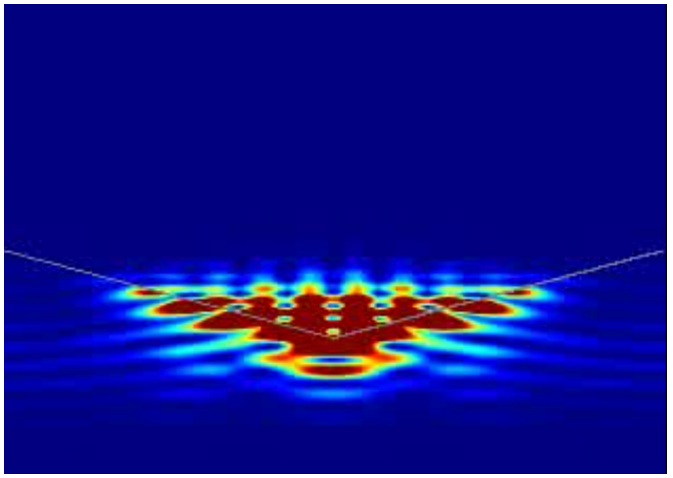


www.lumerical.com

Geometrická vs vlnová optika



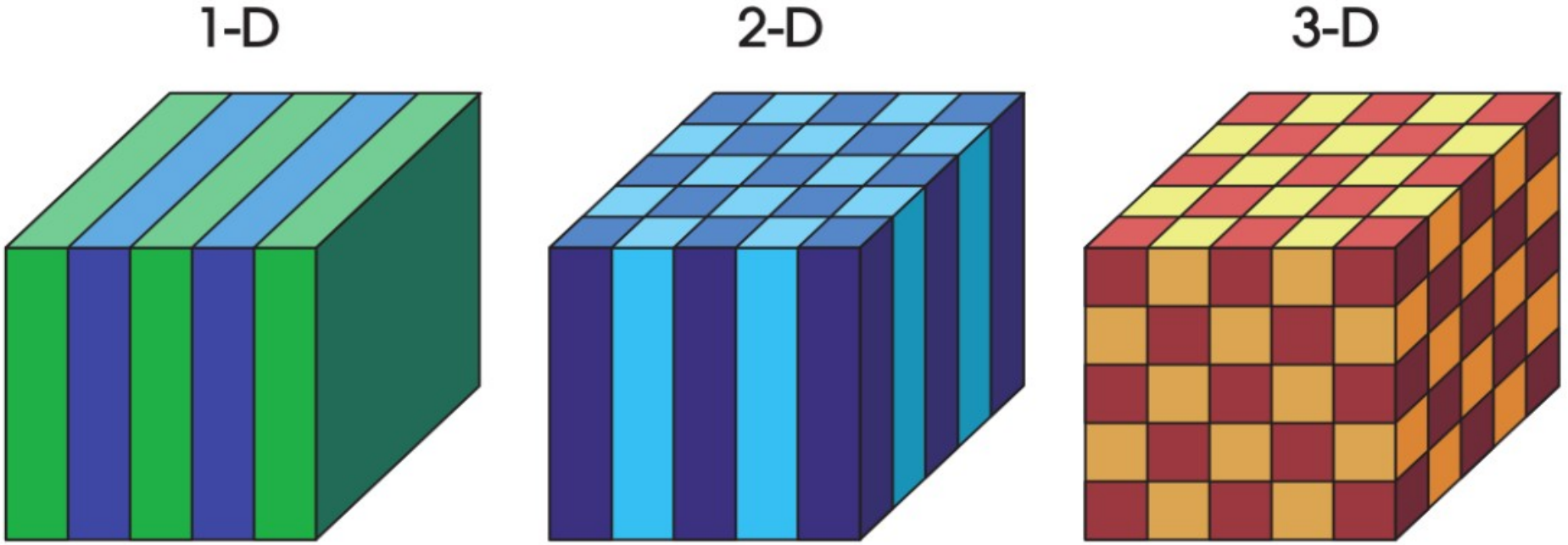
- Totální odraz; λ=0,4 μm



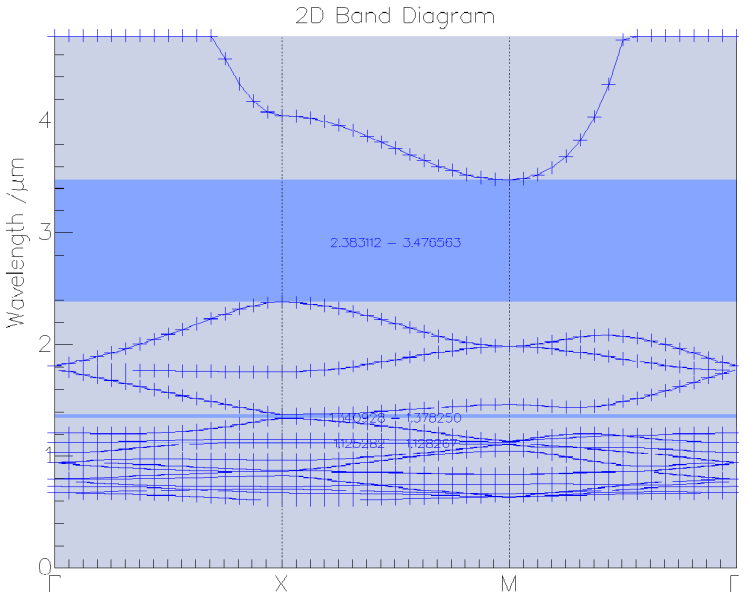
- λ=4 μm

Fotonické krystaly

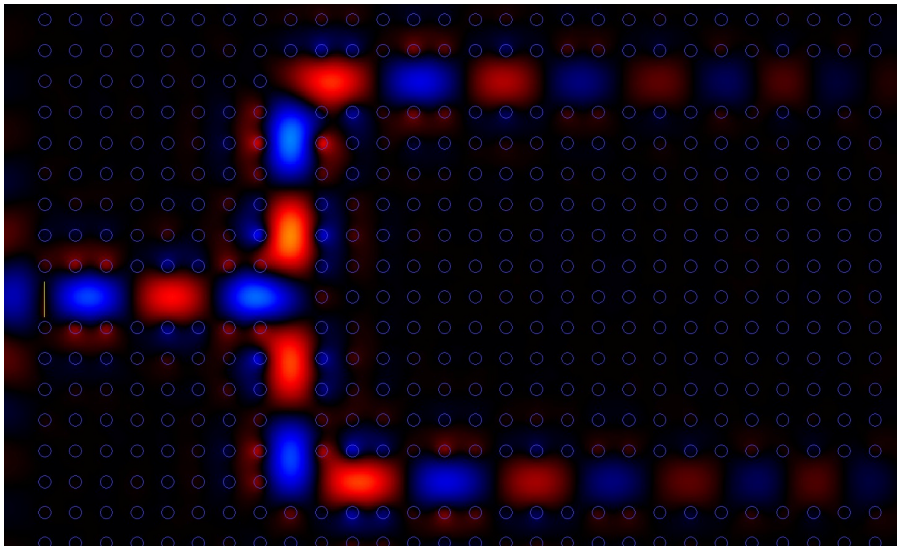
- Periodicita, $\lambda \approx \Lambda$
- Dielektrika (nebo kovy)

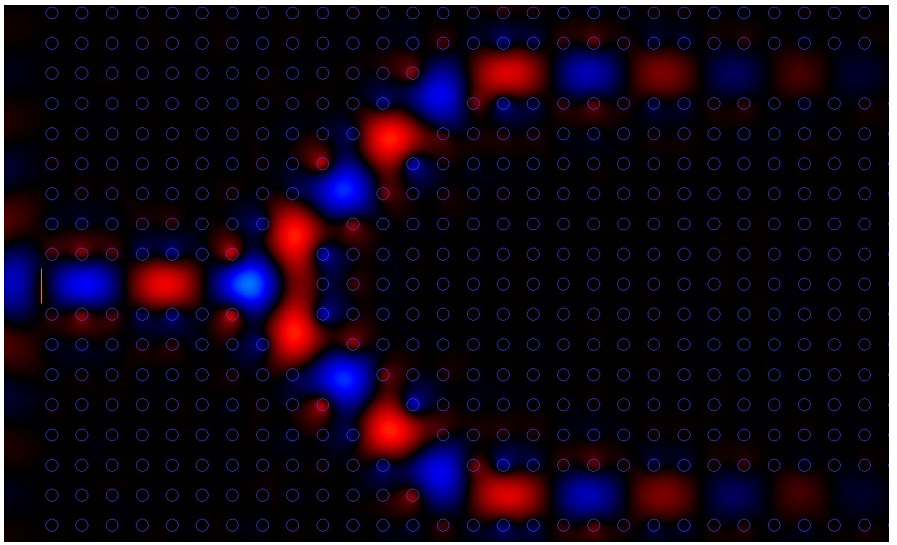


http://ab-initio.mit.edu/book/photonic-crystals-book.pdf

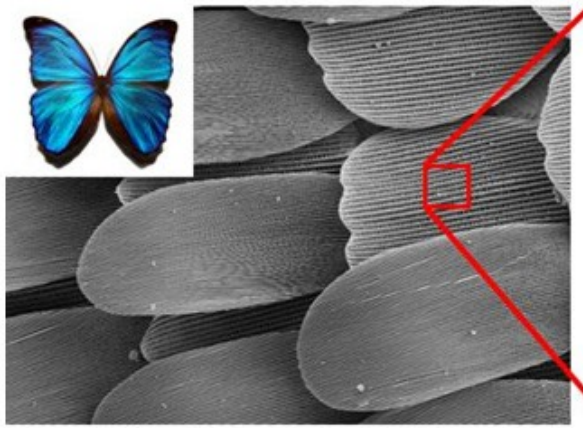


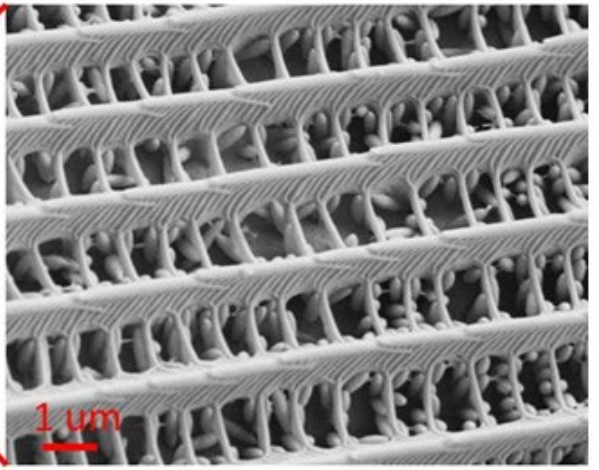
- Pásový diagram
- Zakázaný pás
  - 2,38 – 3,47 μm





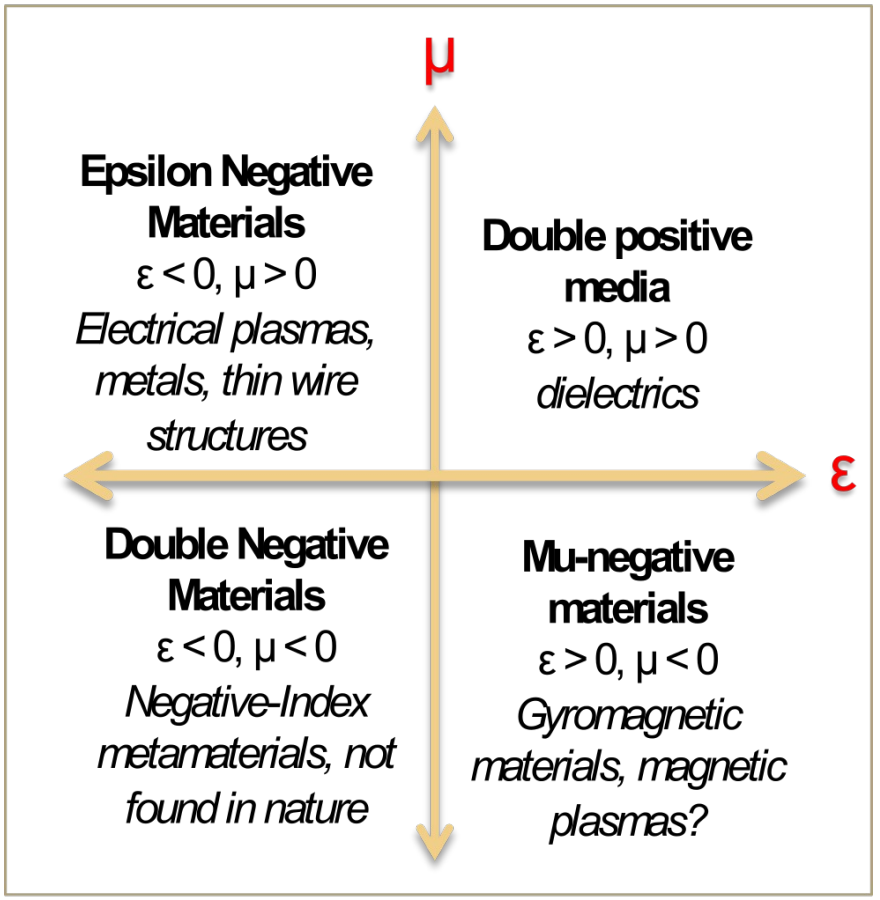
- λ=3 μm (uvnitř zakázaného pásu)
- Děliče svazku




1 µm

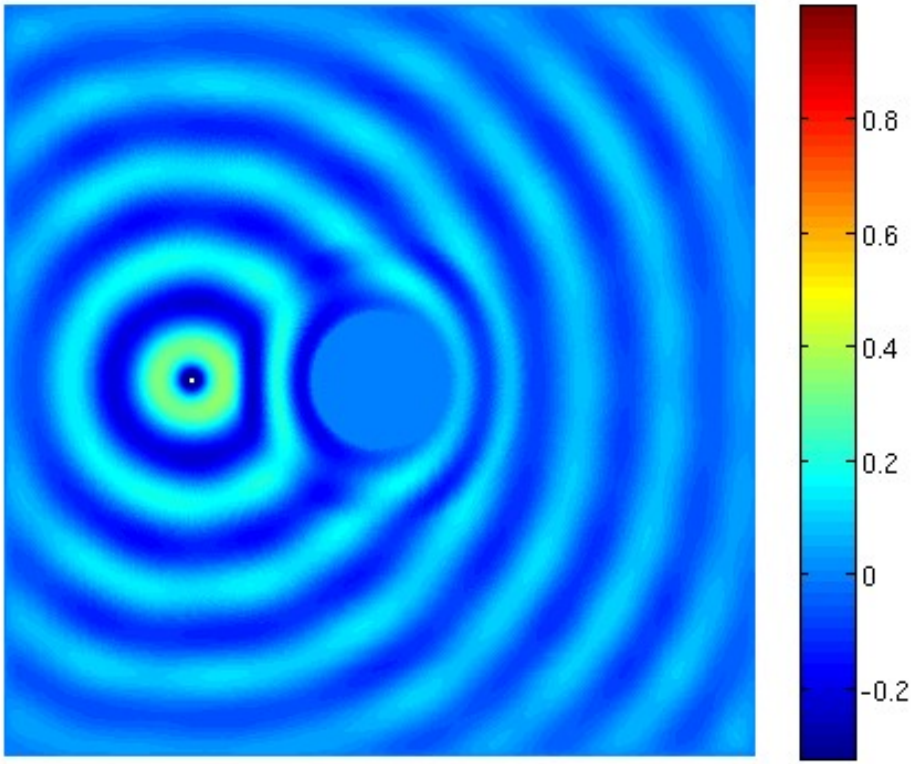
Permitivita a permeabilita

$$n = \sqrt{\epsilon \cdot \mu}$$

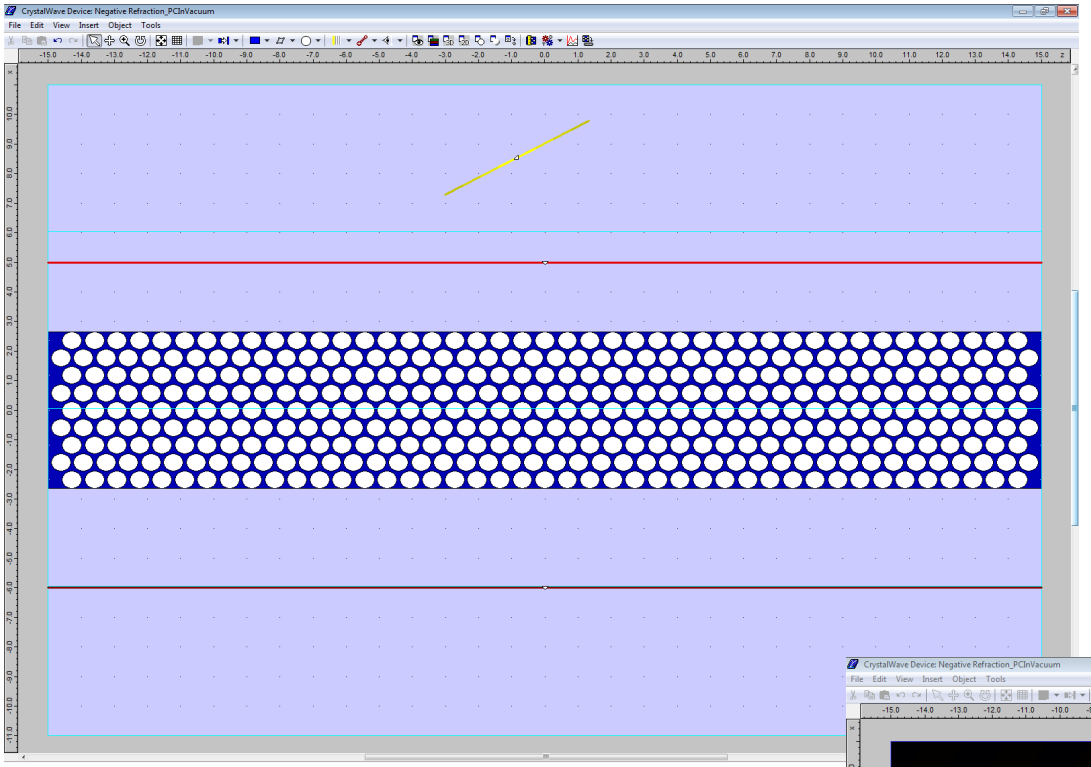


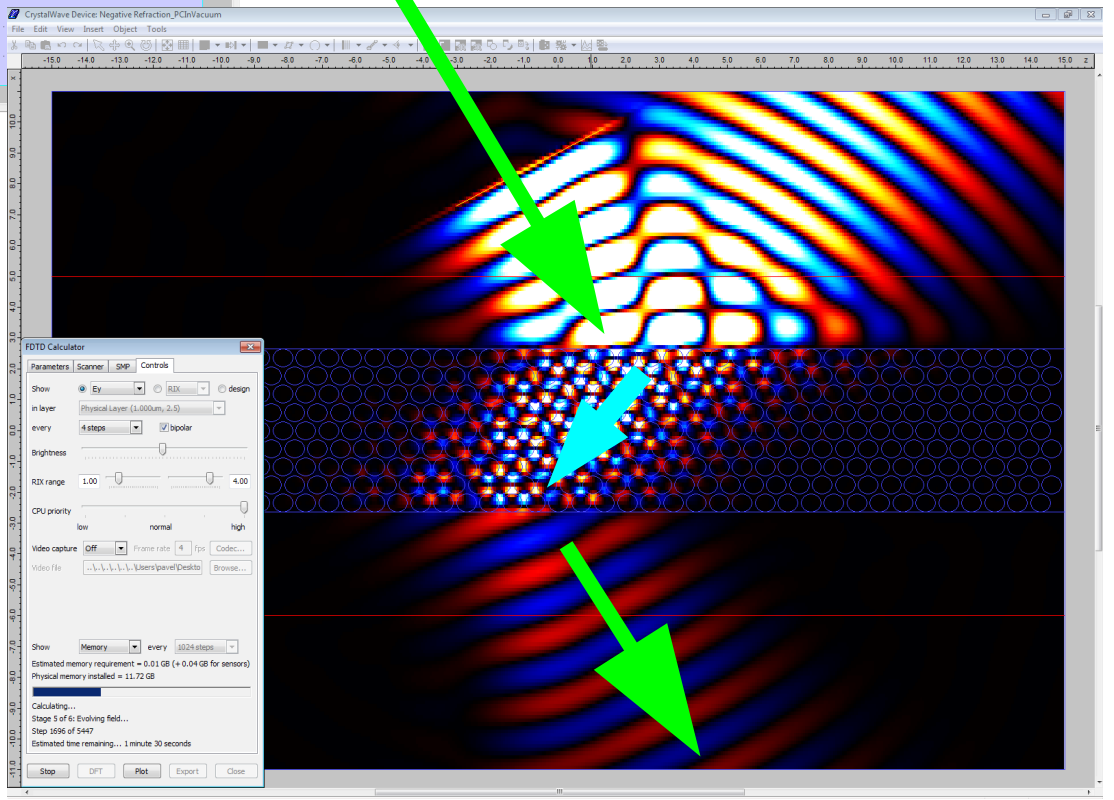
Metamateriály

- Záporný index lomu → optical cloaking



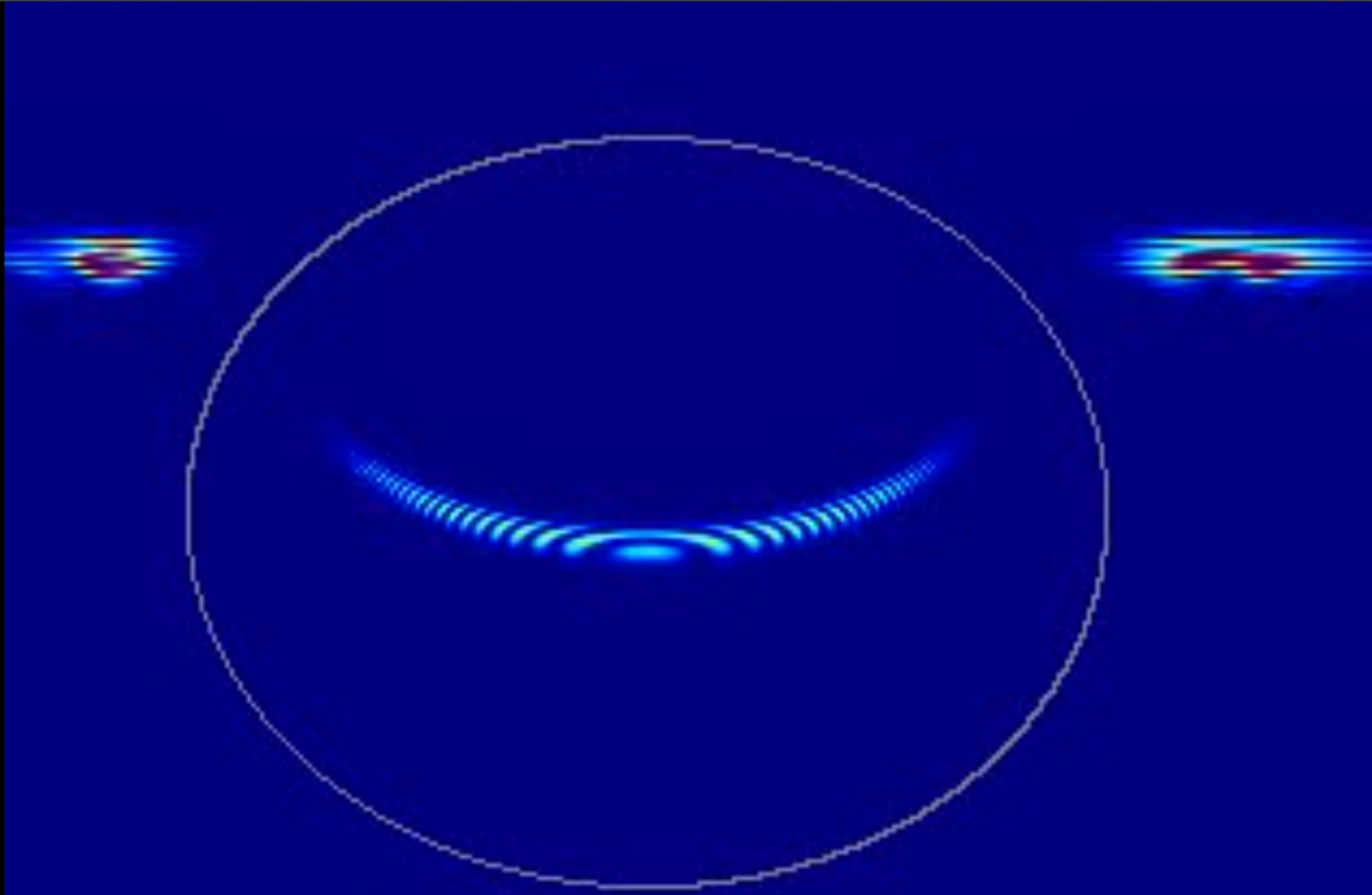
Negativní index lomu pomocí fotonických krystalů





Poděkování

- RNDr. Jan Proška – zapůjčení motýlů
- Ing. Vojtěch Svoboda, CSc. - organizace TV@J
- Našim drahocenným garantům; jmenovitě:
    - doc. Dr. Ing. Ivan Richter
    - Ing. Jan Fiala, PhD.
    - Ing. Pavel Kwiecien, PhD.



Děkujeme za pozornost!