

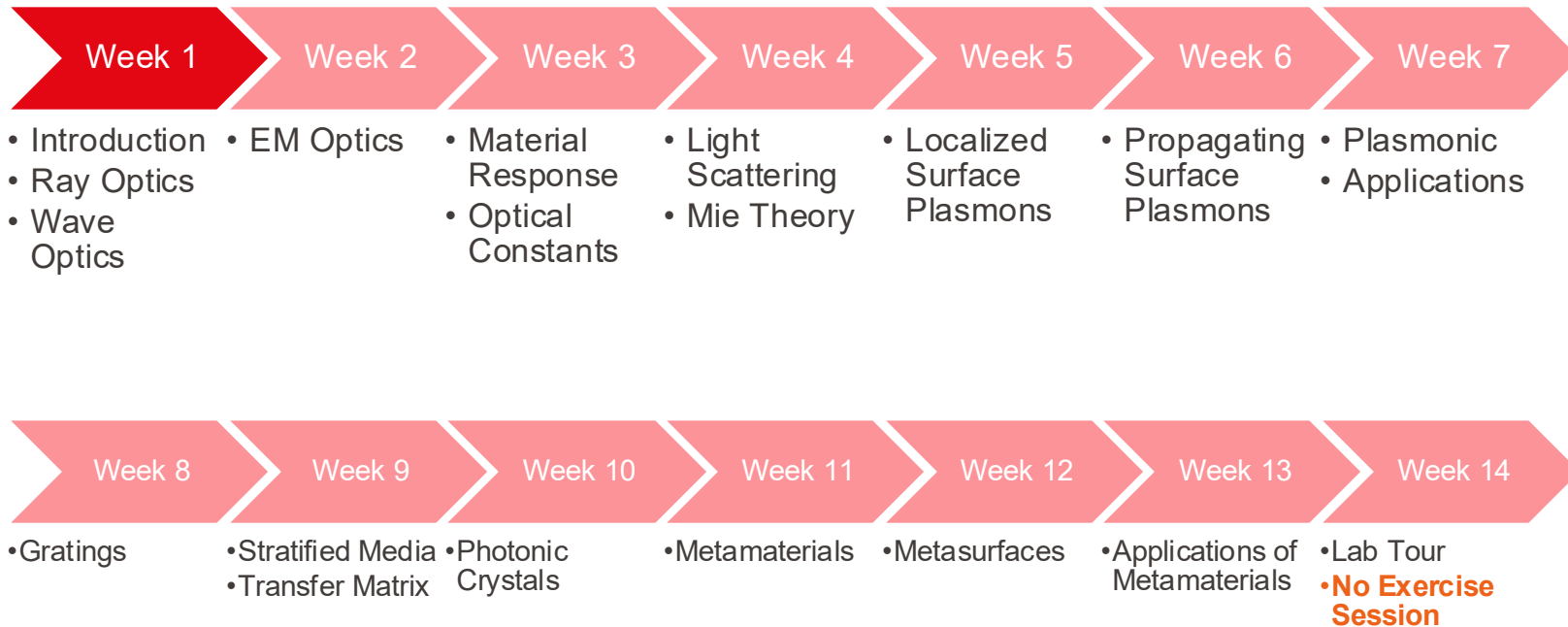
# Week 1

(Introduction and  
Ray/Wave Optics)

Stavros Athanasiou

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# Course Timeline



# About The Notebooks

We will use Jupyter notebooks with Python.

Access the environment : <https://noto.epfl.ch>

Course link : <https://go.epfl.ch/STIAO25>

New notebook will be uploaded every Friday!



# Why Jupyter notebooks?

- Write personal comments
- Answer the questions found throughout the notebook
- Write new piece of code
- Experiment! Vary the parameters and examine what you get.

## Week 1 : Ray and Wave Optics

### Introduction

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### Tools & Utilities

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### Exercise 1.1 : Fermat's Principle and Optical Path Length

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### Exercise 1.2 : Wave Propagation

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### Exercise 1.3 : Dispersion Relations

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### Exercise 1.4 : Total Internal Reflection in a Prism

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### Check Your Understanding

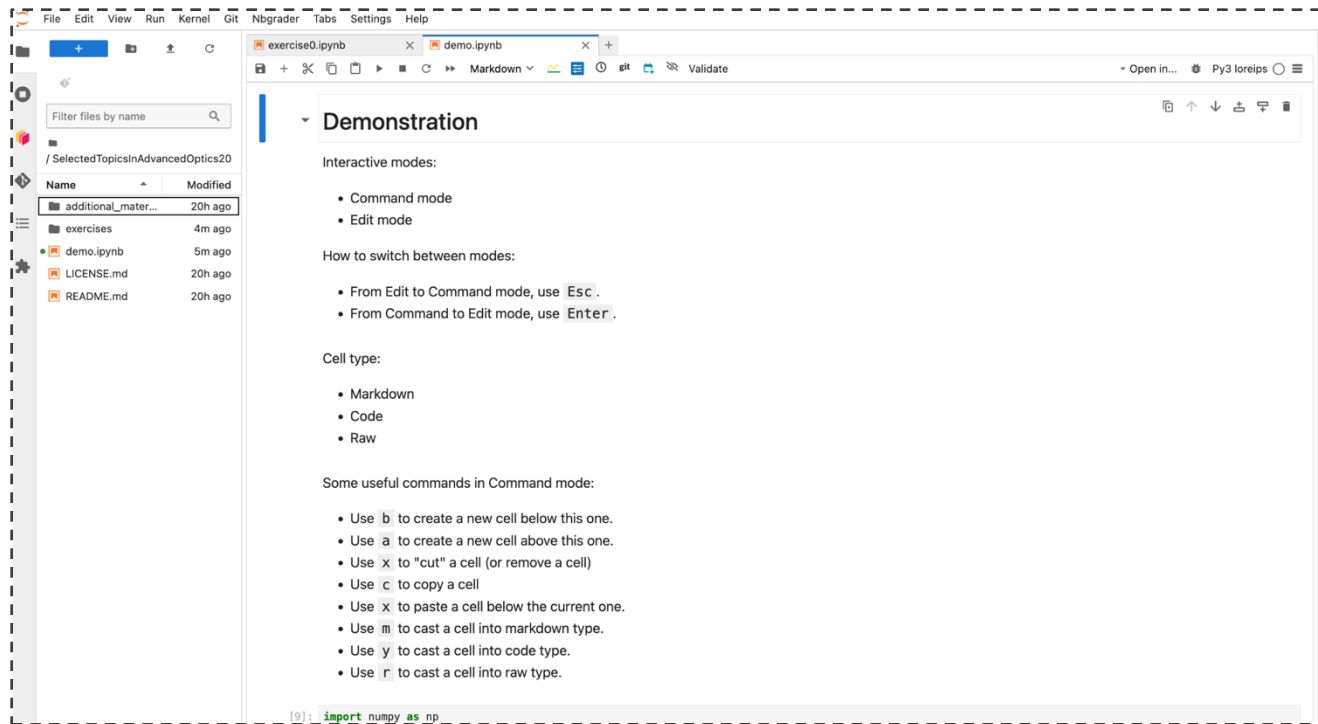
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### Suggested Solutions

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1. **Task** : Involves writing a few lines of code, such as implementing an analytical expression in Python.
2. **Task** : This task requires an analytical approach, such as deriving a simple expression or determining a quantity by substituting values into an analytical solution (e.g., finding the critical angle)
3. **Task** : For this task, you will need to create a plot or some other form of visualization.
4. **Task** : These questions will prompt you to explain the results you obtained and demonstrate your understanding of them.

Use the course link : <https://go.epfl.ch/STIAO25>



The screenshot displays the Nbgrader web interface. On the left, a file explorer shows a directory structure with files like 'additional\_mater...', 'exercises', 'demo.ipynb', 'LICENSE.md', and 'README.md'. The main content area is titled 'Demonstration' and contains the following text:

Interactive modes:

- Command mode
- Edit mode

How to switch between modes:

- From Edit to Command mode, use `Esc`.
- From Command to Edit mode, use `Enter`.

Cell type:

- Markdown
- Code
- Raw

Some useful commands in Command mode:

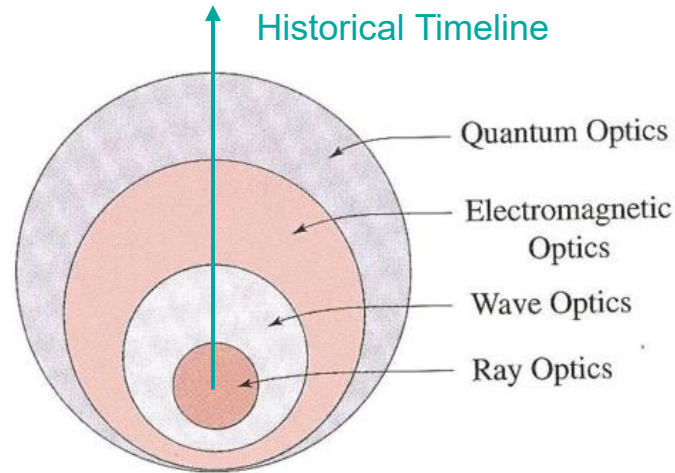
- Use `b` to create a new cell below this one.
- Use `a` to create a new cell above this one.
- Use `x` to "cut" a cell (or remove a cell)
- Use `c` to copy a cell
- Use `X` to paste a cell below the current one.
- Use `m` to cast a cell into markdown type.
- Use `y` to cast a cell into code type.
- Use `r` to cast a cell into raw type.

At the bottom of the interface, a code cell contains the text: `[9]: import numpy as np`

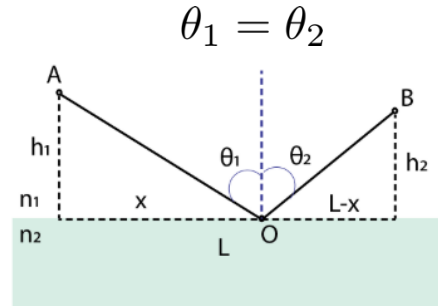
# The field of Optics

The word “Optics” comes from the Greek work “Ὀπτική”, which has the following meanings:

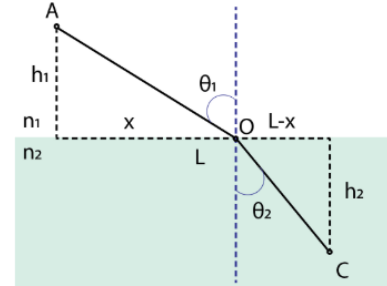
- Literal : appearance, relating to seeing
- Metaphorical : point of view, opinion



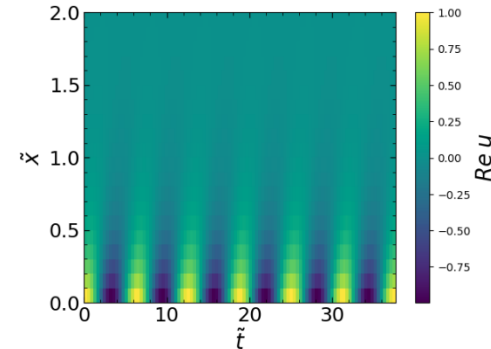
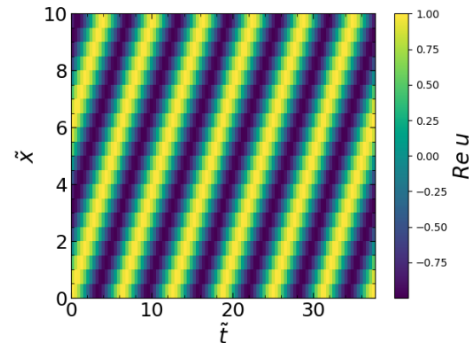
- Fermat's Principle



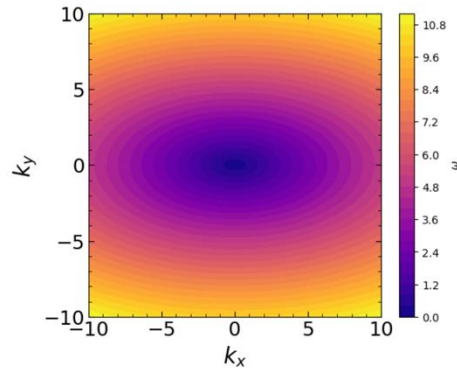
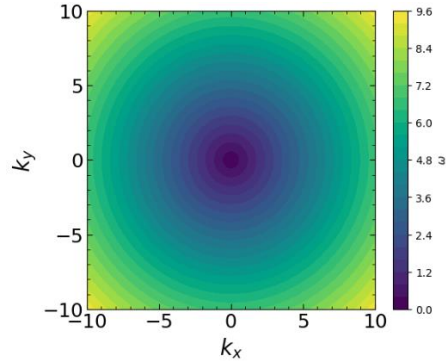
$$n_1 \sin \theta_1 = n_2 \sin \theta_2$$



- Propagating and evanescent waves



- Dispersion relations



- Reflection in a prism

