Physics 108 Assignment#8 (due on 6/2/2021)

Reading materials:

Pedrotti 3rd Edition: **Chapter 14:** 14-1, 14-2
Lecture Notes: pp. 114 – 129, 139 - 147

Homework: (Pedrotti 3rd Edition)

1. 14-2
2. 14-3
3. 14-4
4. 14-13
5. 14-14
6. 14-17
7. Specify the polarization state for the following four un-normalized Jones vectors

   (a) $\begin{bmatrix} -\mathrm{i} \\ +\mathrm{i} \end{bmatrix}$; (b) $\begin{bmatrix} -1+i \\ 1+i \end{bmatrix}$; (c) $\begin{bmatrix} -1-i \\ 1+i \end{bmatrix}$; (d) $\begin{bmatrix} i \\ 4 \end{bmatrix}$

8. **Jones Matrices**:

   A beam of light with unknown state of polarization serves as the start to produce light beams of well-defined polarization with the aid of one or a combination of polarizing devices at your disposal (linear polarizer, quarter-wave-plates, half-wave-plates, wave-plates with any other phase shifts than 90° or 180°, rotator, etc)

   $$\tilde{\tilde{E}}_{\mathrm{inc}} = \begin{bmatrix} \alpha \\ \beta e^{i\Delta\Phi_0} \end{bmatrix}$$

   (**Extra 2 points**) What device or combination of devices will you use to produce a linearly polarized light along y-axis if losing some of the incident beam energy is permitted? (Show the Jones matrix or matrices, how you set it or them up, and how the final Jones vector is what you are looking for.)

   (**Extra 2 points**) What device or combination of devices will you use to produce a left-circularly polarized light if losing some of the incident energy is permitted? (Show the Jones matrix or matrices, how you set it or them up, and how the final Jones vector is what you are looking for.)

(**Extra 4 points**) What device or combination of devices will you use to produce a linearly polarized light along y-axis without losing any of the incident beam energy (assuming that there is no reflection loss)?