

VE438: ADVANCED LASERS AND OPTICS LABORATORY

LABORATORY MANUAL

LAB 8: SECOND HARMONIC GENERATION<sup>1</sup>

Course instructor: Dr. Wan Wenjie

Teaching assistant: Yang Jianfan, Chen Yao

UM-SJTU JOINT INSTITUTE  
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<sup>1</sup>Edited based on the material and feedback from course instructor and previous TAs: Feng Yaming, Cao Jianjun and Shang Ce. Last Updated by Yang Jianfan(June 17, 2019)

# 1 Suggested Reading Assignment

*Fundamental of Photonics* (Saleh & Teich) Ch 19

# 2 Pre-lab Questions

1. Find out key components or working principle of a green laser pointer.
2. What is the phase matching condition for second harmonic generation?

# 3 Procedure

NOTICE:

- Pay attention to all lab safety instructions. Lasers used in the lab may hurt your eyes if you look into the beam directly.
  - Equipment used in optics experiments such as mirrors and prisms are very fragile thus special operating rules need to be followed. Your grade for in-lab operation will be deducted for improper operations.
  - Make sure the checklist below is clear before leaving the lab:
    - ☐ The experiment setup have been shown to the TA;
    - ☐ The data sheet has been checked and signed by the TA;
    - ☐ The equipment have been restored;
  - TA will give a question to one of the group member to check your understanding on lab content. Grade for in-lab operation and the question will be shared among the whole group.
1. Mount the semiconductor Laser diode.
  2. Mount the nonlinear crystal.
  3. Adjust the distance and the angle between the diode and the crystal, and show the fundamental mode of the green light.
  4. Use a CD-ROM and observe the dispersion between the pump light and the signal light.