

問題設定型光科学教育プログラムと 実践的テクノロジスト育成プログラム

Elementary teaching laboratory and
Education program through Danger experience and Failing observation

Objectives

先端科学研究の基盤となる光科学分野での人材育成には、幅広い視野を持ち、オリジナリティを開拓していく強い意欲と、それを達成させるために必要な機器の極限性能まで見越した実験経験が不可欠となっている。ここでは、問題を自前で定義し、オリジナリティを持つことに重点をおいた Elementary Teaching Laboratory と現在のブラックボックス化している機器を使う研究での教育の危なさをカバーするために、危機・限界を超えさせ、失敗により学ばせる危機・限界体験実験プログラムを行っている。

For the education of young scientists and graduate students in optical science, we have developed two new education programs entitled “Elementary Teaching laboratory: ETL” and “Education program through Danger experience and Failing observation: GenkaiT”. In ETL, the graduate students design their own teaching program and use this to educate undergraduate students. To facilitate this program, we stock the clean rooms and optical tables with a large supply of optical elements. Participants in the program are free to use a wide range of instruments including ultra-short pulse lasers, high energy pulse lasers, ultra-stabilized lasers, fiber lasers, as well as evaporation coating and optical polishing machines. Each year, approximately 15 new experimental teaching programs are developed by the students. The 2009 ETL programs include “AR coating”, “Semiconductor laser amplifier”, “Nitrogen laser”, “Making optical fibers”, “Holograms”, and so on. Through this ETL, students can learn about their subjects in great detail and achieve a better understanding of their own research.



Fig.1

Achievements

- 毎年15～20の新しい学生主導の実験教育プログラムが開発
- 開発されたプログラムで、社会人教育、地域科学教育に貢献
- 15の危機・限界体験実験を含む大学院教育専門科目が開始

In the GenkaiT program, we prepare various experience education experiments. Experimental equipment used in research typically has several in-built features such as fail-safe systems, limiters, and micro-computer controls. Although such systems are important for conducting successful and safe experiments they have the disadvantage that students can often view these devices as “black box systems” and are prevented from gaining valuable technical experience. To improve this situation, we have prepared an experimental course aimed at graduate students in which they are given experience of failing, over limitation, and dangerous accidents. Some of the topics covered include “explosive accidents with capacitors”, “destruction with 200 MPa over pressure”, “ignition of liquid oxygen”, “fiber fuse with 100W CW laser”, “simulation of eye hazard accident with laser”, and “Electric shortening accident”. After completion of this course, students will have experience related to a variety of possible accidents in research work and will have a deep understanding of the interior of many instruments.

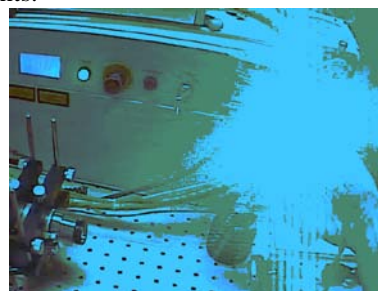


Fig.2

Fig. 1: Construction of 20W DPSSL in ETL 2009 program.

Fig. 2: Simulation experience of eye hazard accident with 100W high power CW laser.

References

- 1) Hitoki Yoneda, Education Program of Optical Science in University of Electro-Communications, Rev. Laser Eng., vol. 36 Issue 3, pp.152-157 (2008).
- 2) 米田仁紀、他、問題設定型光科学教育プロジェクト、電気通信大学紀要 vol.19, p.203-210 (2006)