

High Intensity Focused Argon Ion Beam System

DHEERAWAN BOONYAWAN

**A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN PHYSICS**

**GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
MARCH 2002**

High Intensity Focused Argon Ion Beam System

DHEERAWAN BOONYAWAN

THIS THESIS HAS BEEN APPROVED
TO BE A PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY
IN PHYSICS

EXAMINING COMMITTEE

N. Chirapatpimol

.....
Assoc. Prof. Dr. Nara Chirapatpimol

CHAIRMAN

T. Vilaithong

.....
Assoc. Prof. Dr. Thiraphat Vilaithong

MEMBER

W. Tantraporn

.....
Dr. Wirojana Tantraporn

MEMBER

Somsorn Singkarat

.....
Assoc. Prof. Dr. Somsorn Singkarat

MEMBER

B. Yotsombat

.....
Asst. Prof. Dr. Bunchob Yotsombat

MEMBER

4 March 2002

ACKNOWLEDGEMENTS

I am truly grateful to Assoc. Prof. Dr. Thiraphat Vilaithong for his helpful advice and encouragement throughout this study. Another major source of help that I wish to acknowledge is Dr. Wirojana Tantraporn.

Prof. Dr. Jurgen Engemann is specially acknowledged for his useful discussion of the design of the retarding field energy analyzer. Prof. Dr. John Verboncoeur is cited for his helpful suggestion on running the XOOPI simulation, and Prof. Dr. Helmut Wiedemann for his valuable advice on the emittance measurements.

I would like to thank all Fast Neutron Research Facility staff for their kind assistance, notably Mr. Rachen Charoennukul, Mr. Prathom Vichaisirimongkol, Mr. Sakchai Amkaew, Mrs. Sumatan Thararux and Mrs. Kusumal Dechthamarong.

Mr. Michael Rhodes is remembered for his wonderful beam profile monitor and Nonglak Tondee and Pantawat Chaiwan for their help on beam emittance measurements.

I also acknowledge Dr. Gordon Hiebert for his valuable suggestions.

My parents and my wife, Chompunuch, and my children, Neu and Nae have supported my research for years and their help is hereby acknowledged.

A grant from the Thailand Research Fund (TRF) made the whole research effort possible and TRF is thanked for their support.

Dheerawan Boonyawan

March 2002