

**Modern Trends in Basic and Applied
Laser Spectroscopy
Lund 2010**

Laser Spectroscopy – *My Way*

The Past and the Future

Sune Svanberg

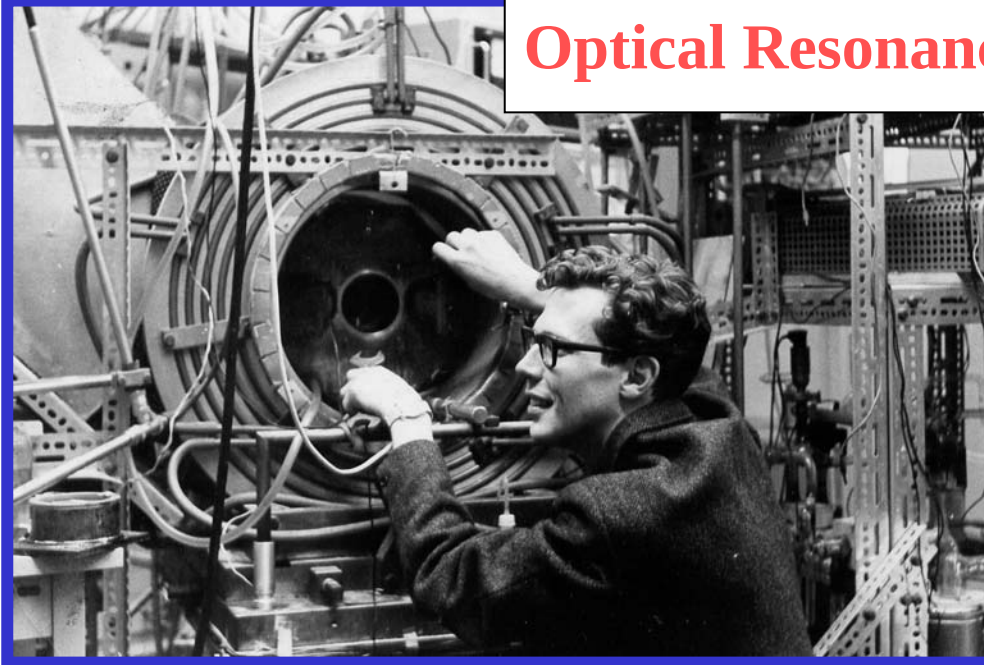
**Division of Atomic Physics
and**

**Lund Laser Centre
Lund University
Sweden**

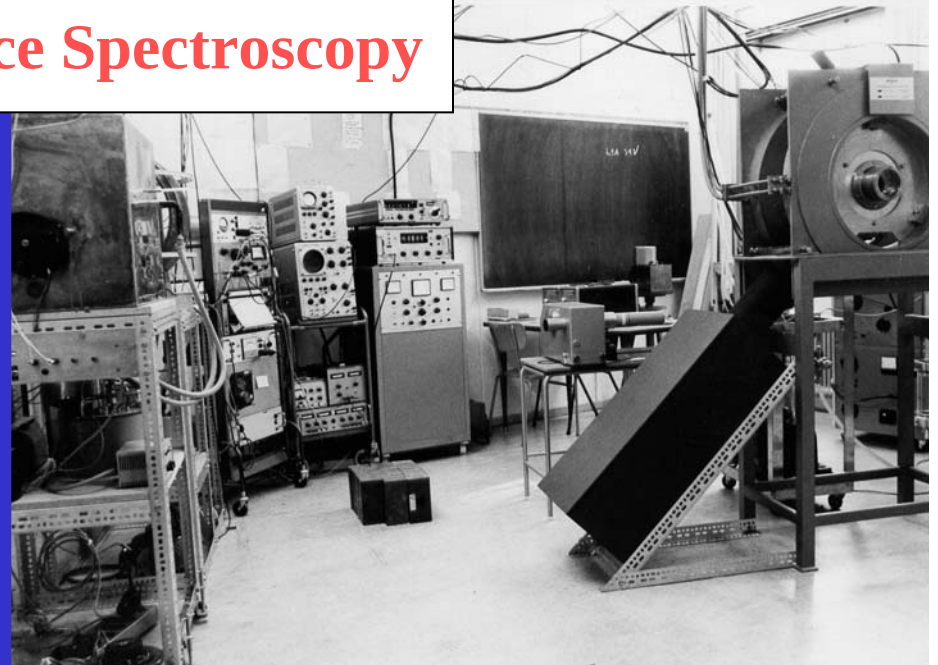


LUND INSTITUTE OF TECHNOLOGY
Lund University

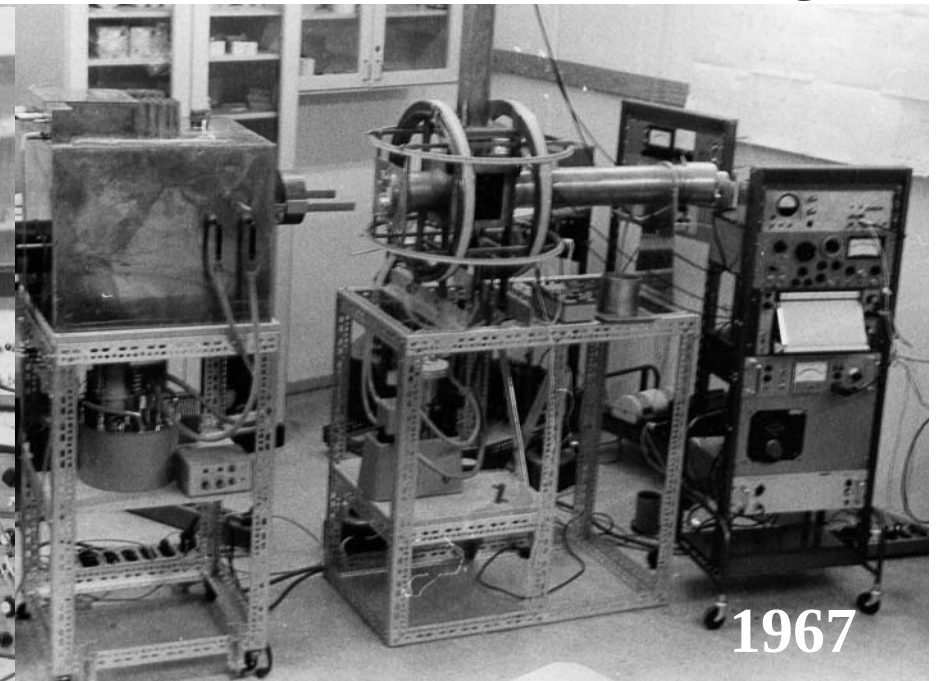
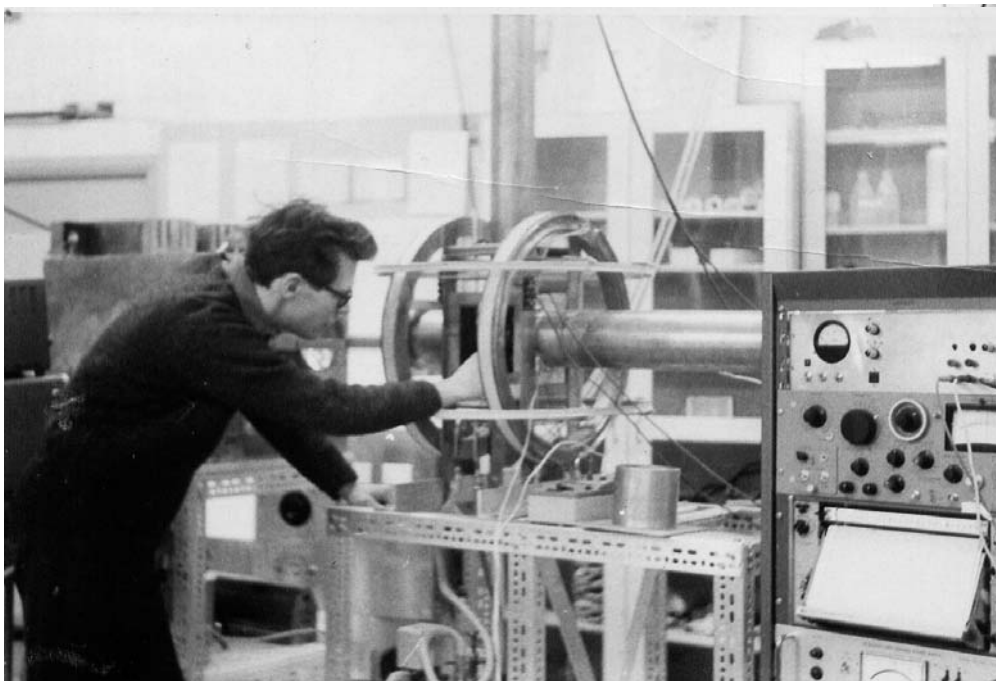
Optical Resonance Spectroscopy



TU Berlin 1967 with H. Bucka



Chalmers 1970 with I. Lindgren



1967

Laser Spectroscopy: New York – Göteborg - Lund



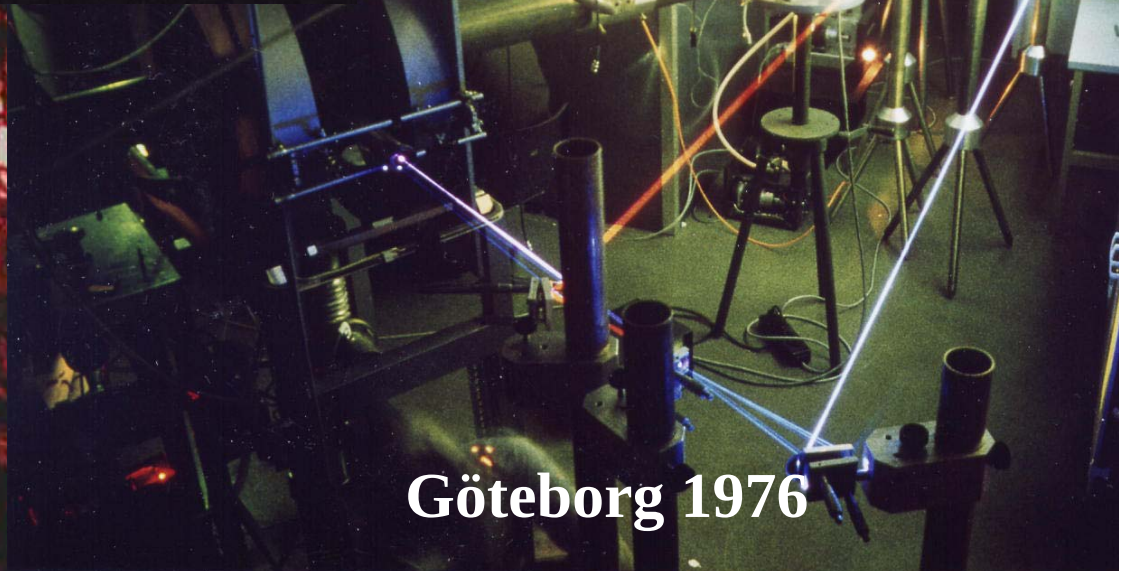
Göteborg 1976



Lund 1981



Columbia 1972



Göteborg 1976

Conference on Laser Spectroscopy Vail, Colorado 1973

S. Svanberg, *Spectroscopy of Highly Excited Levels in Alkali Atoms using a CW Tunable Dye Laser*, in *Laser Spectroscopy*, ed. by R.G. Brewer and A. Mooradian,

Plenum Press, New York 1974.

(work with W. Happer, Columbia University)

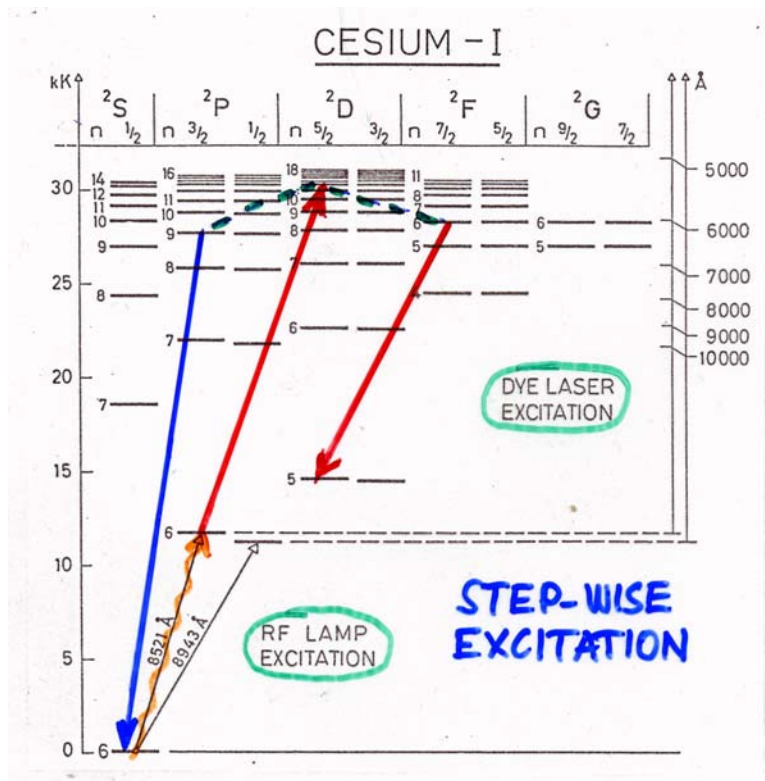
1973 - Vail



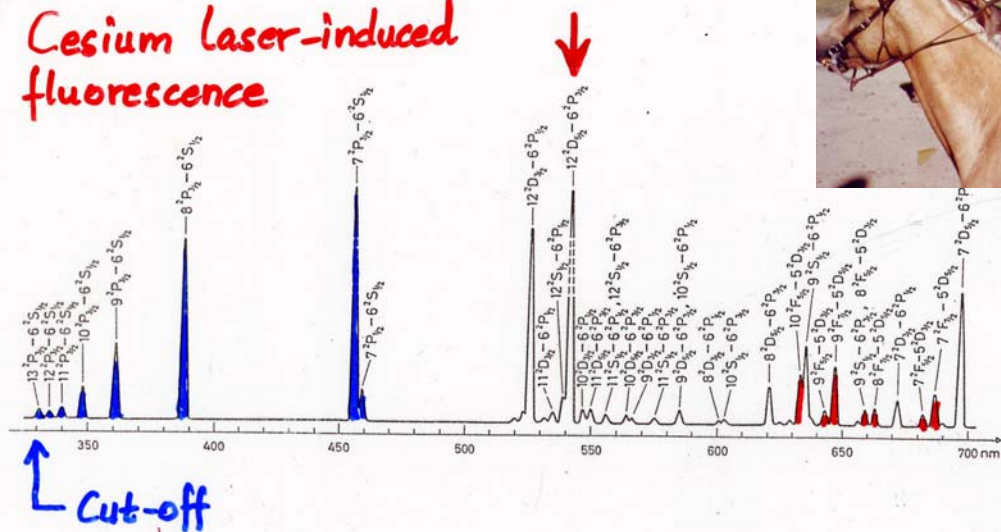
2009 - Kussharo



1987 - Åre

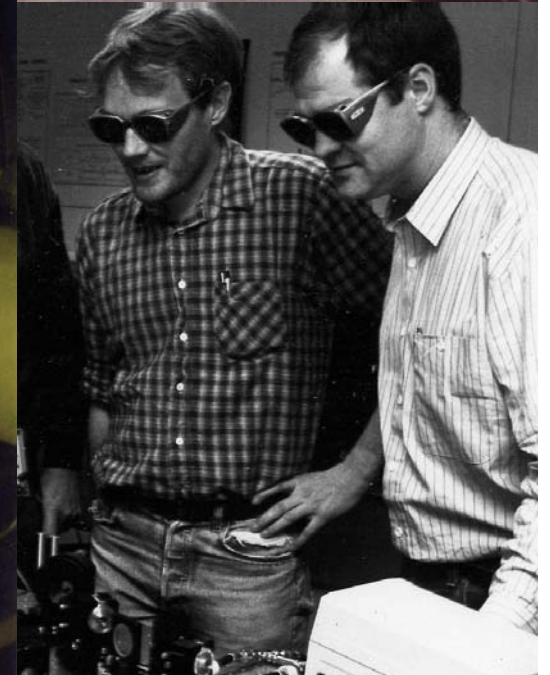
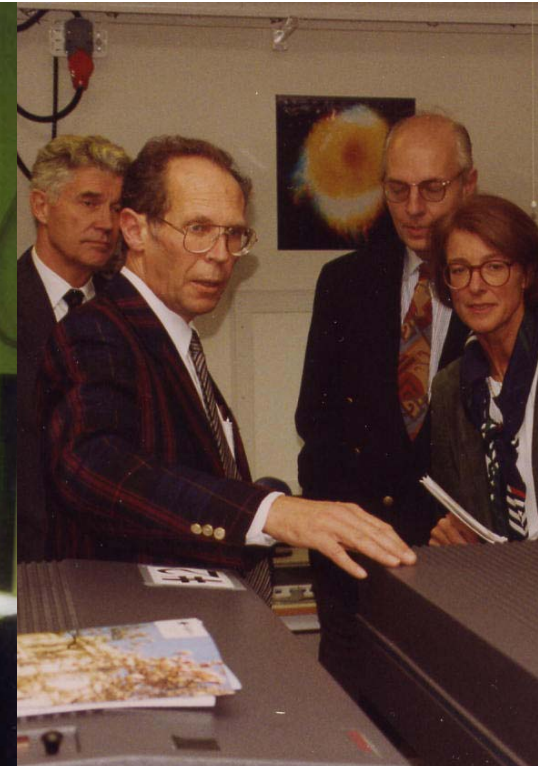


Cesium laser-induced
fluorescence

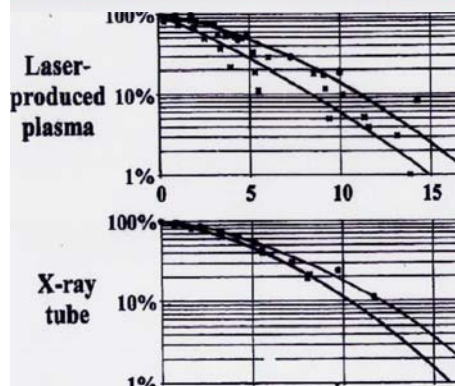
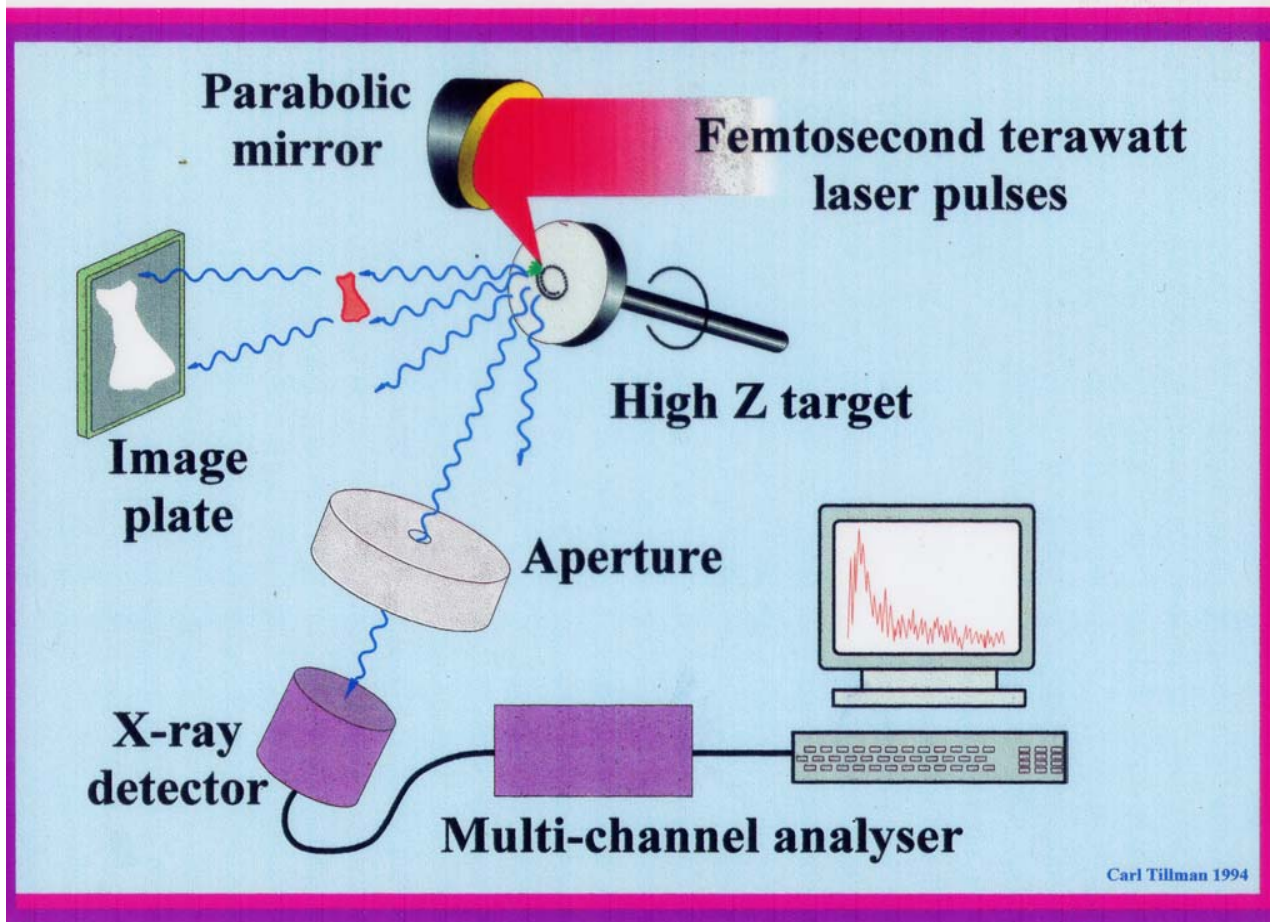


Lund High-Power Laser Facility

1992

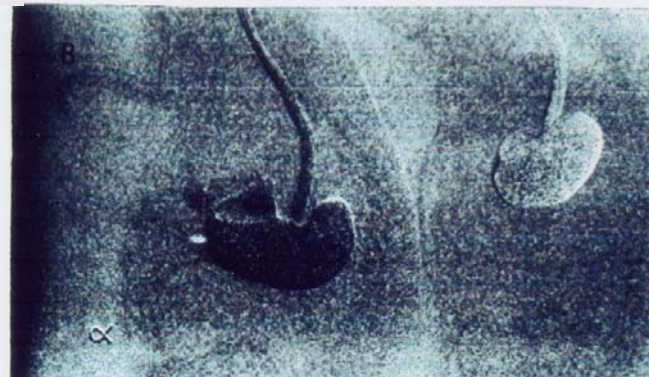
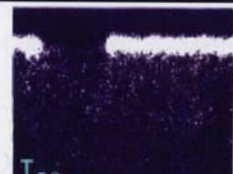


Laser-produced hard X-rays

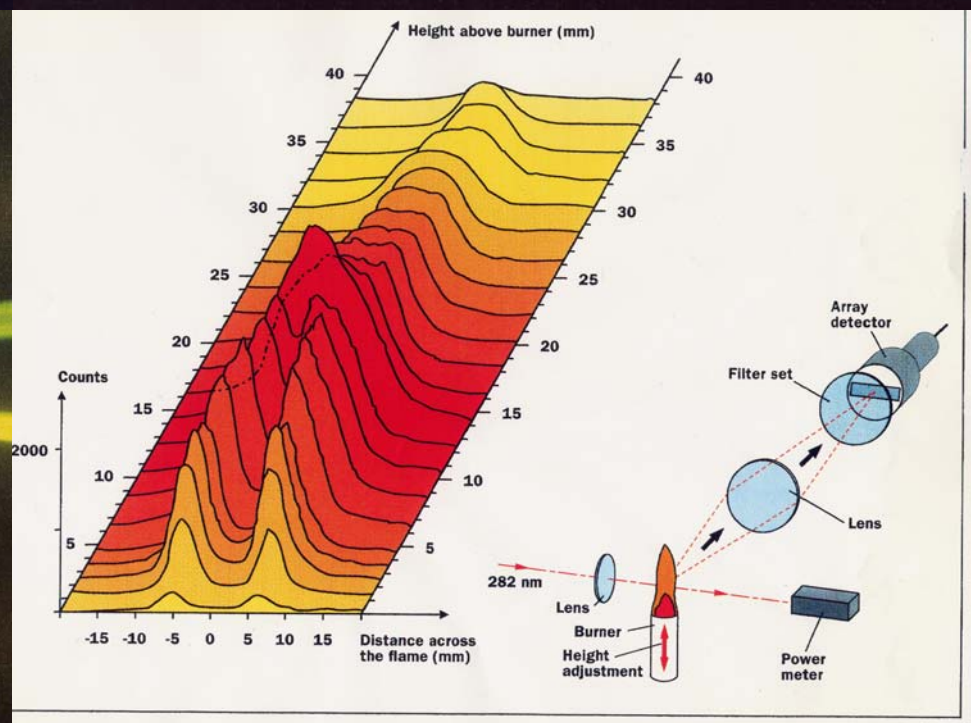
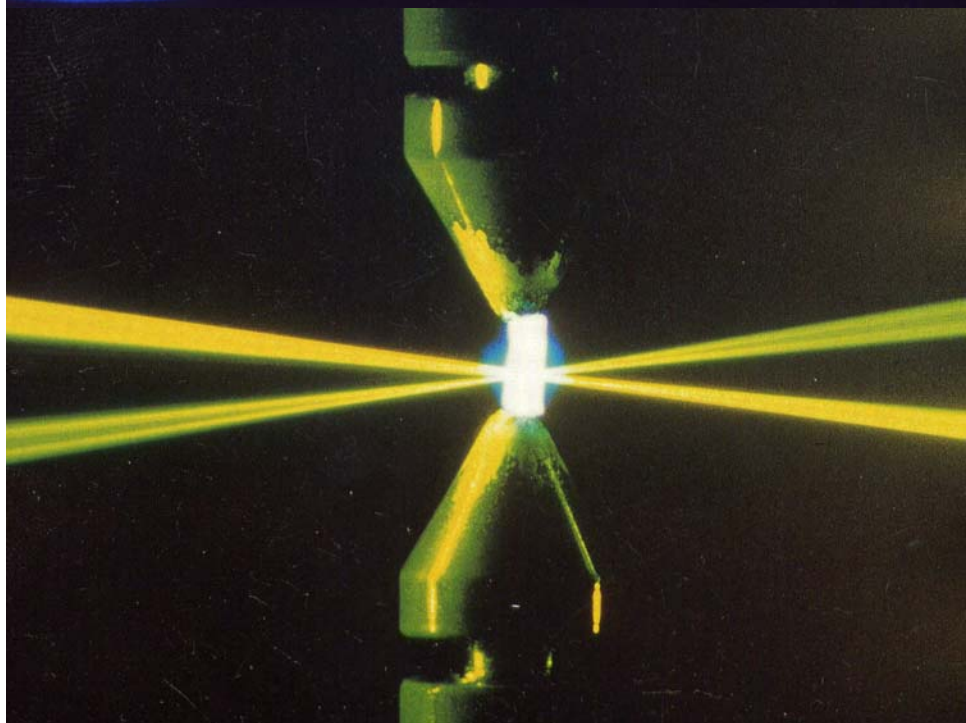
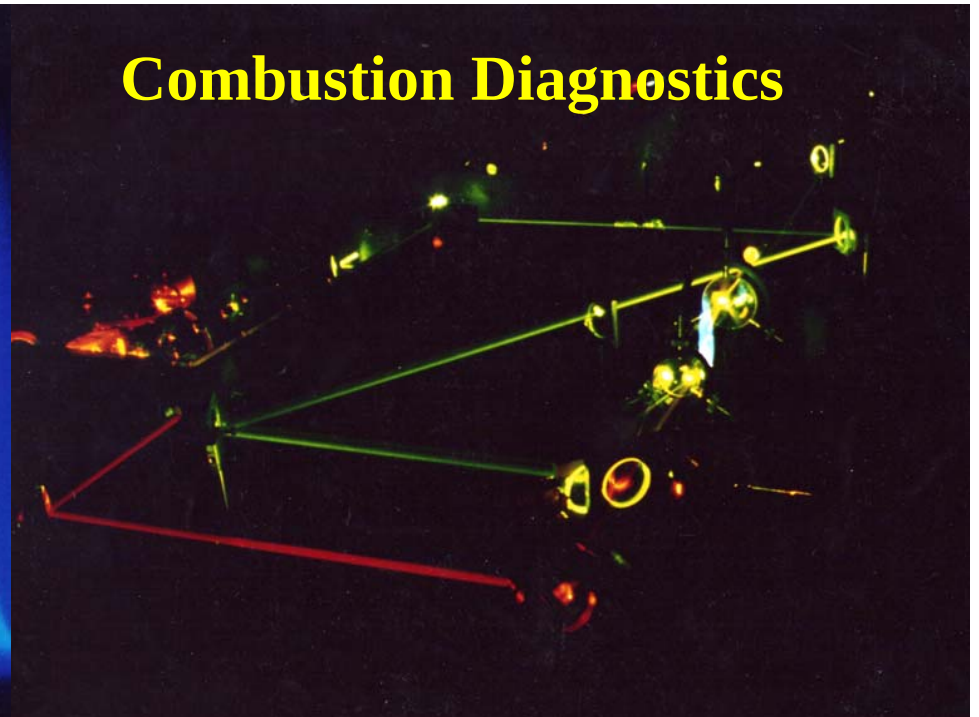
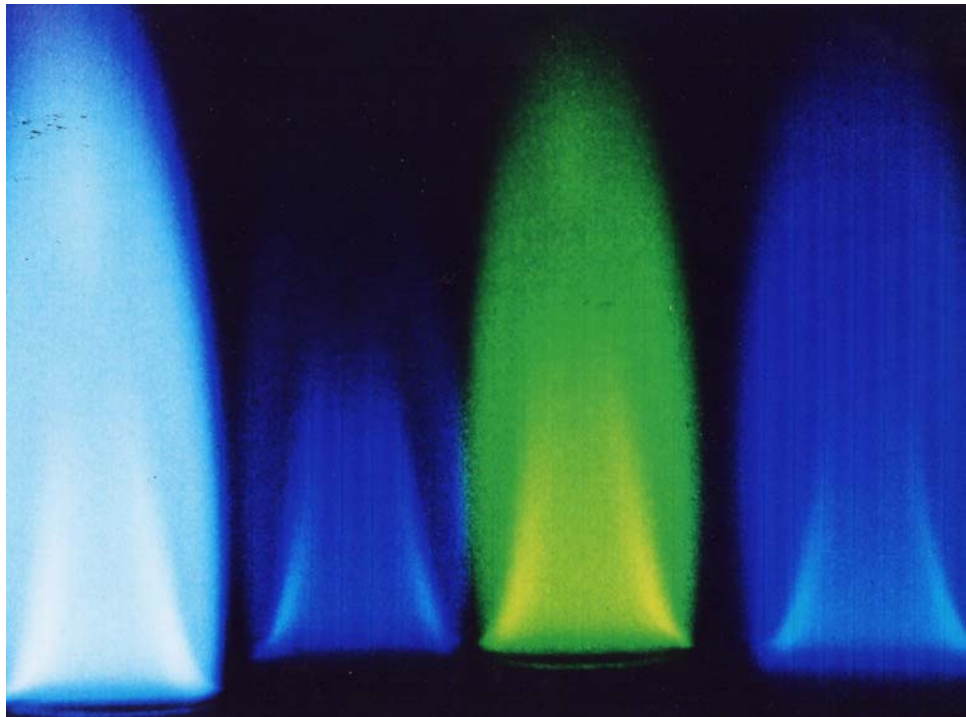


body phantom (12 cm)
Hard X-rays (Ta-target)

lead-shadow



Combustion Diagnostics





First Swedish Mobile Lidar System, CTH 1979



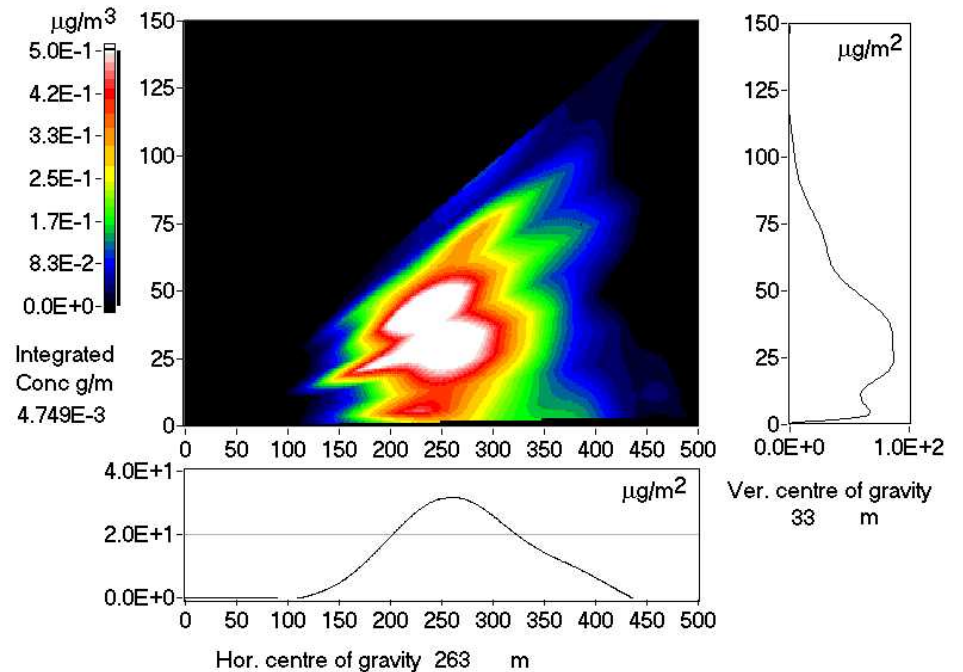
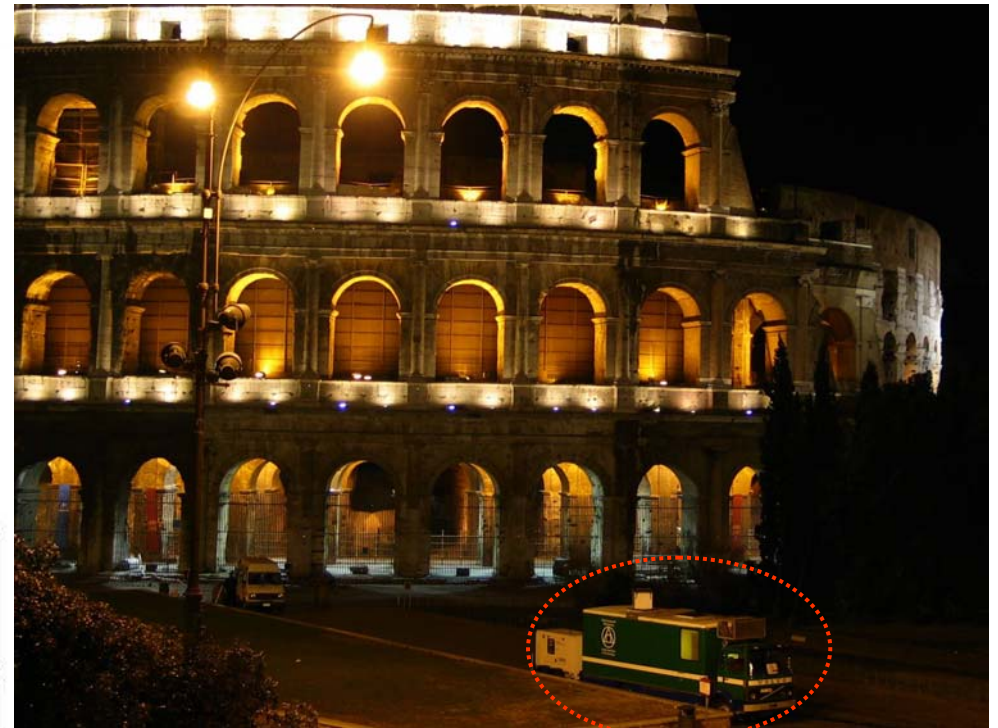
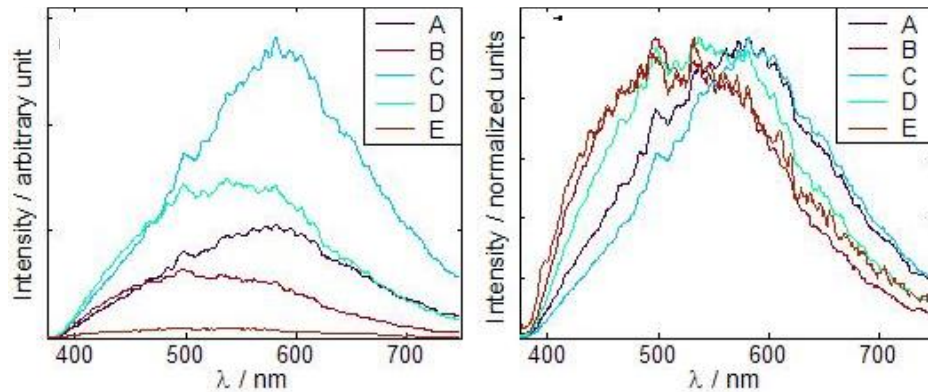
Laser Radar Monitoring of the Environment

Stone deterioration

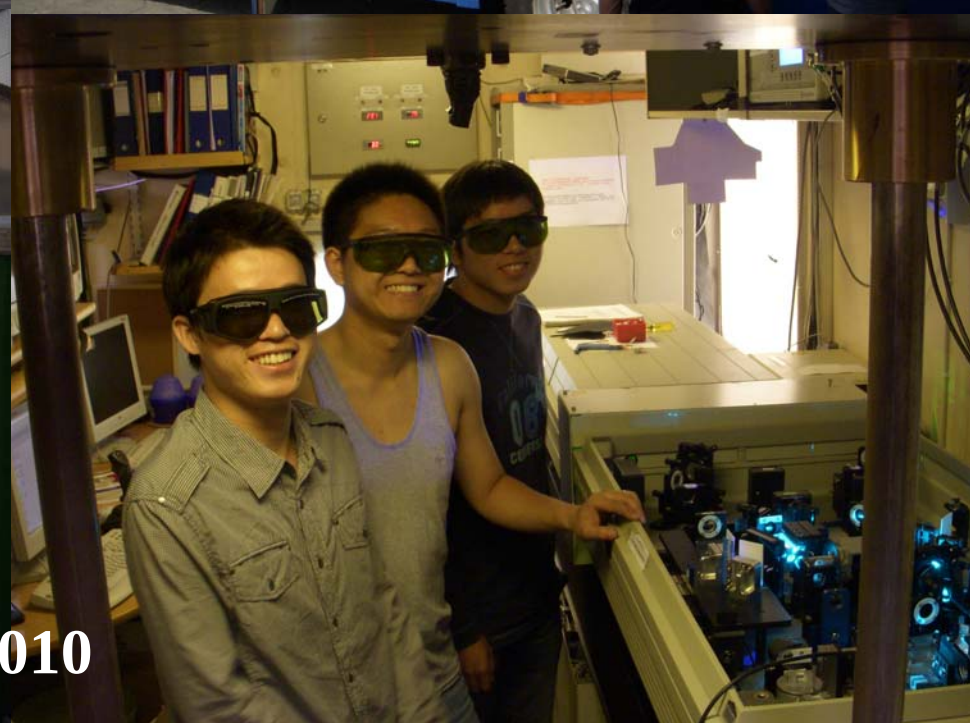
Coliseum in Rome

Mercury emission

Chlor-alkali plant



Lund Lidar at ZJU, Hangzhou



2010

Lidar in Ecology

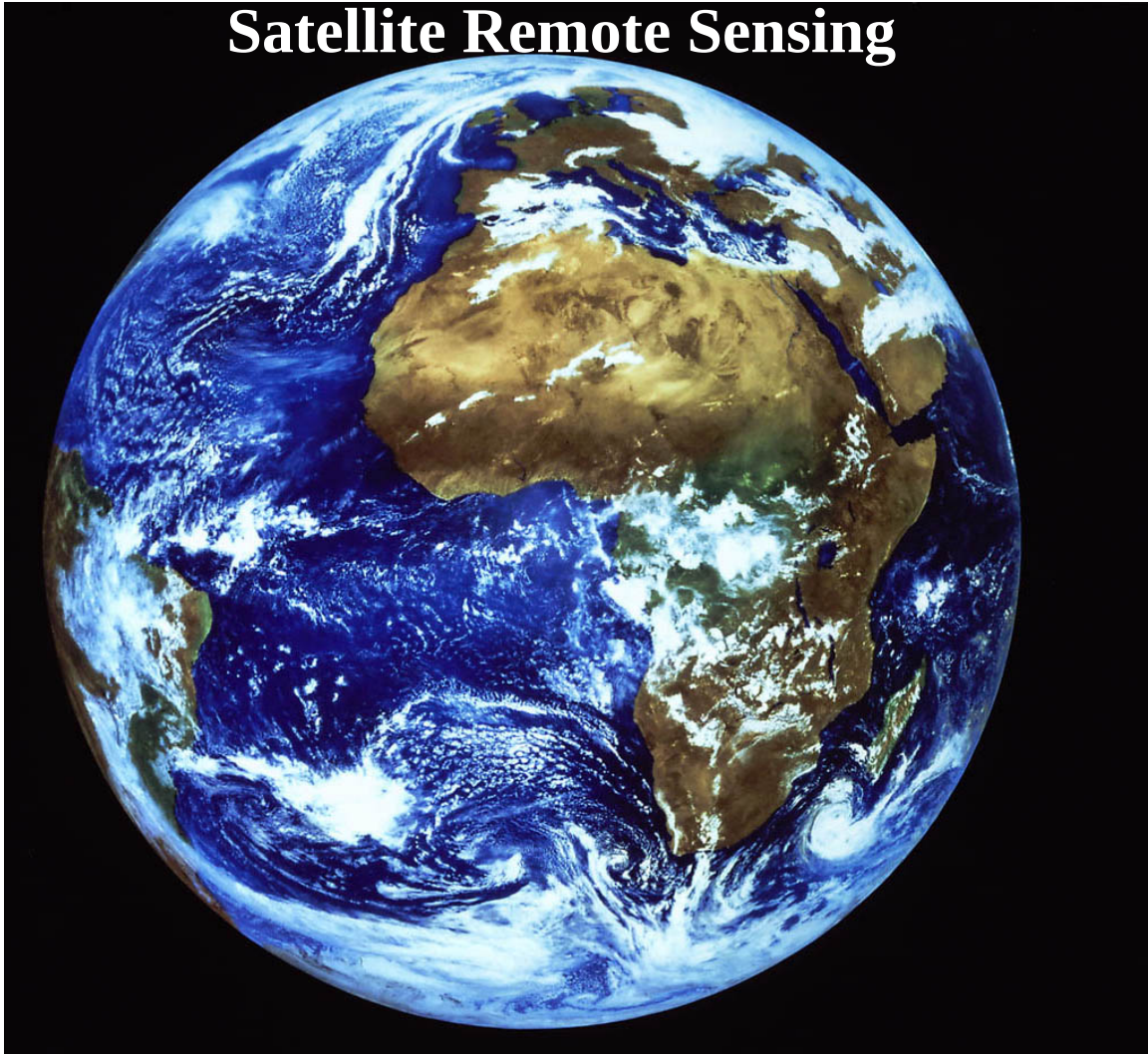


2009

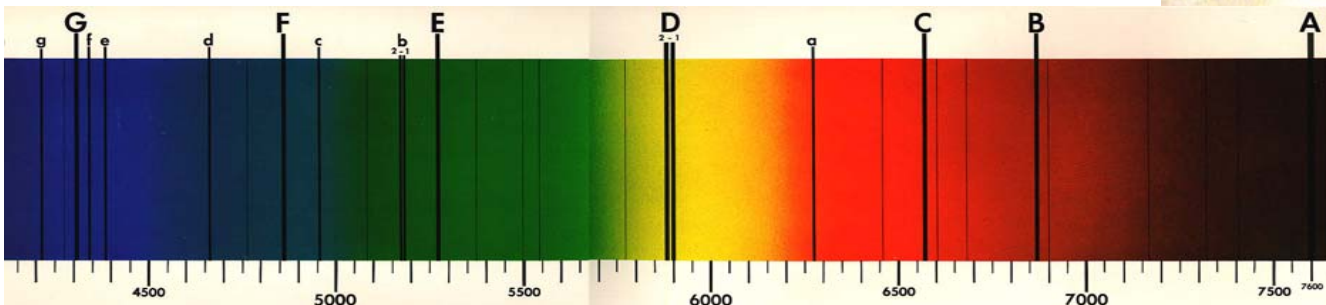


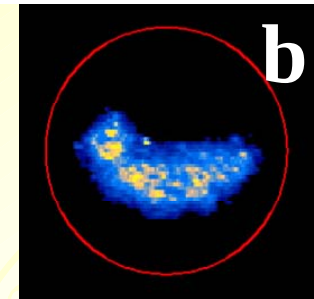
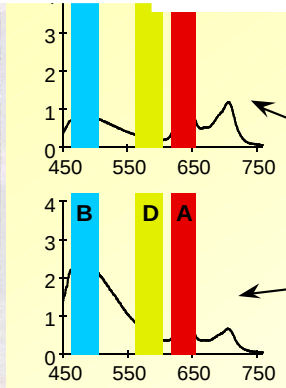
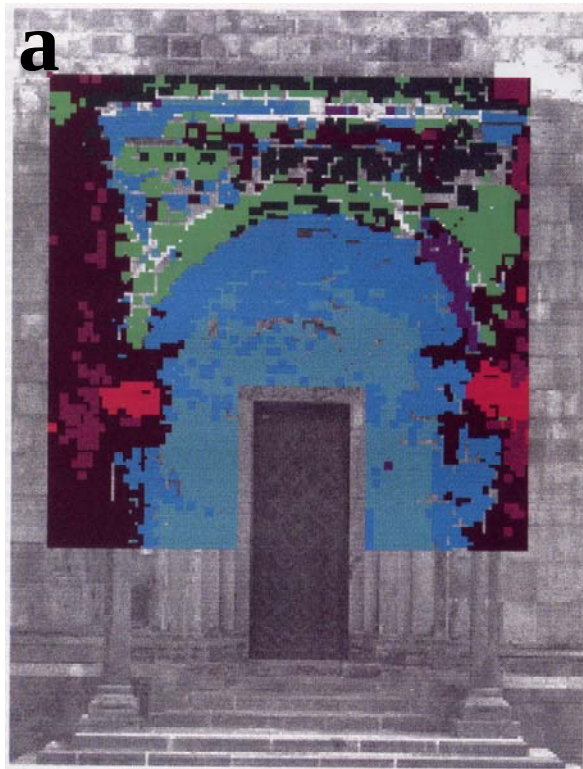
Calopteryx splendens

Satellite Remote Sensing

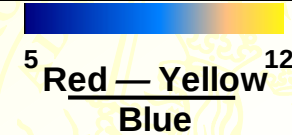


FLEX Fraunhofer Discrimination Vegetation Fluorescence Satellite, ESTEC



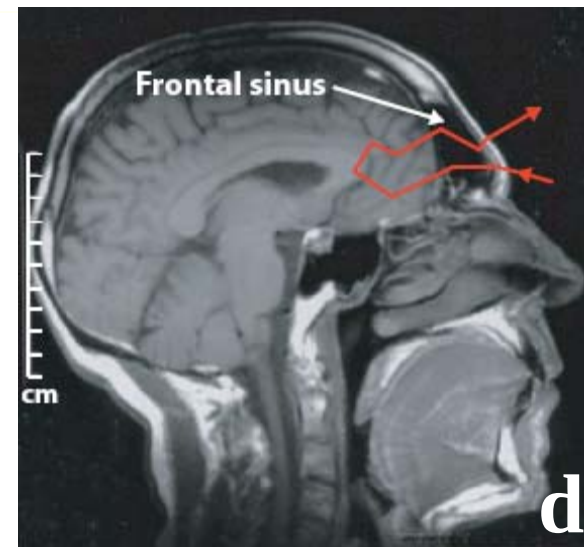
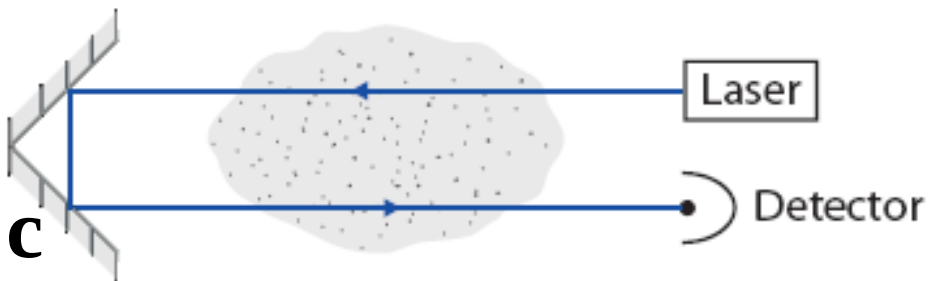


$$F_c = \frac{A - k_1 D}{k_2 B}$$



Medicine

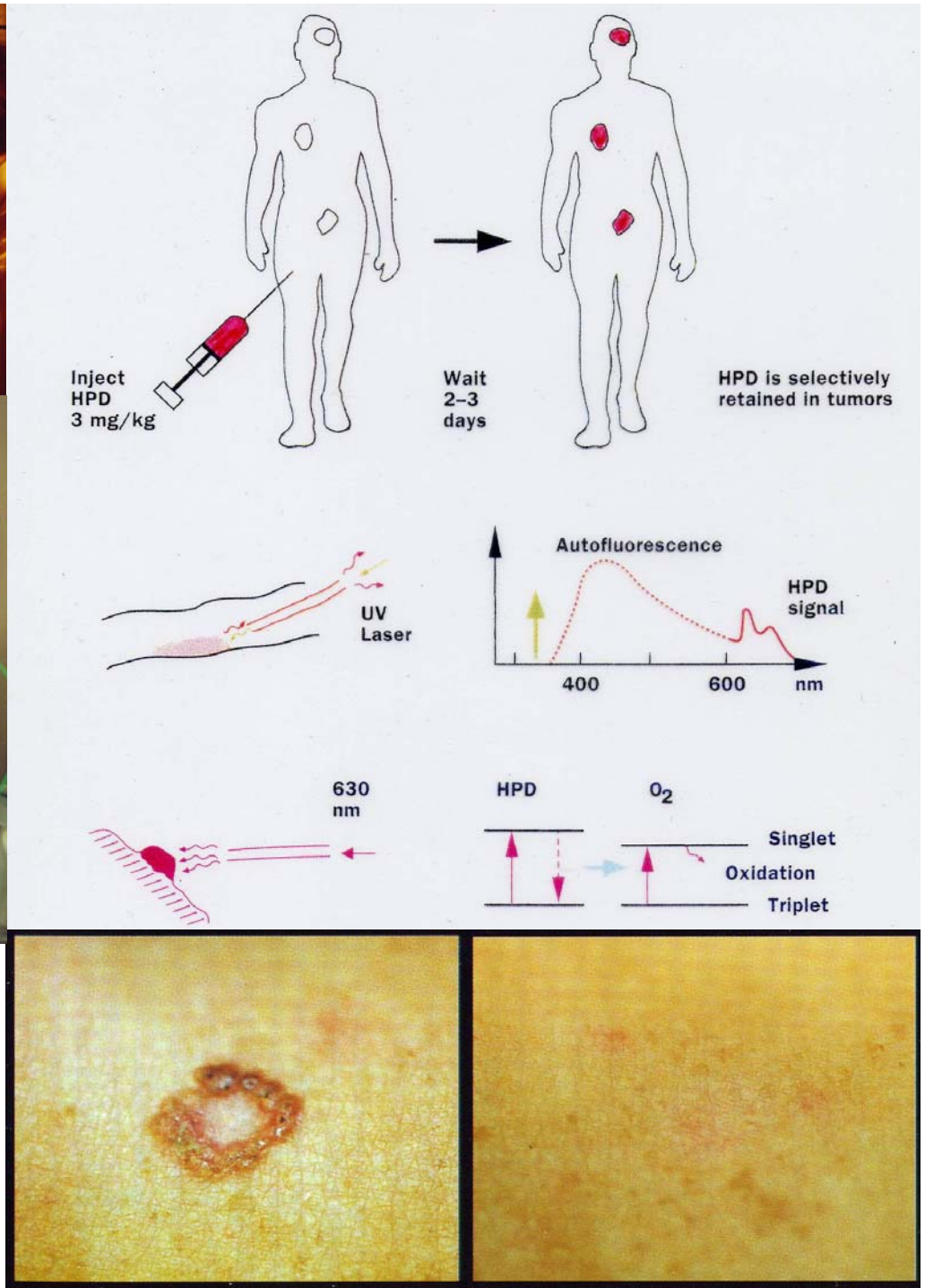
Environment



Photodynamic therapy of malignant tumours

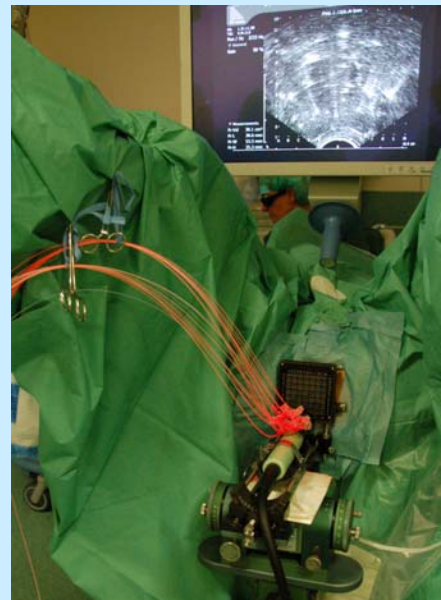
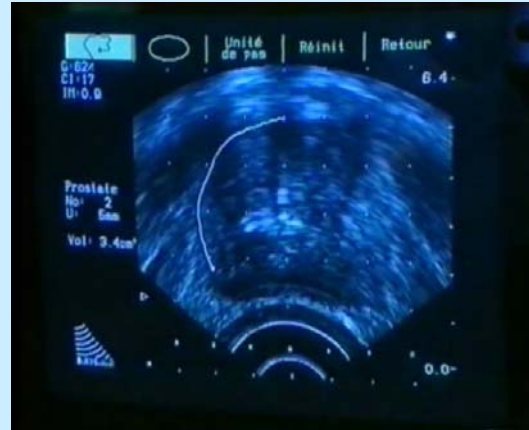


**PDT of basal
cell carcinoma
and squamous
cell carcinoma**

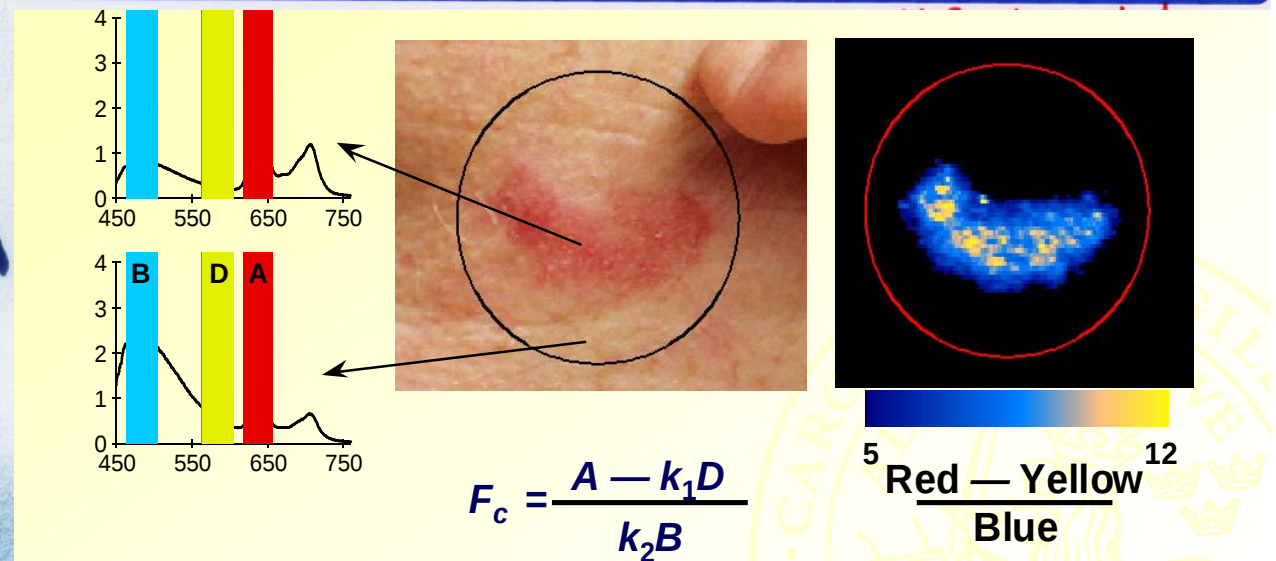
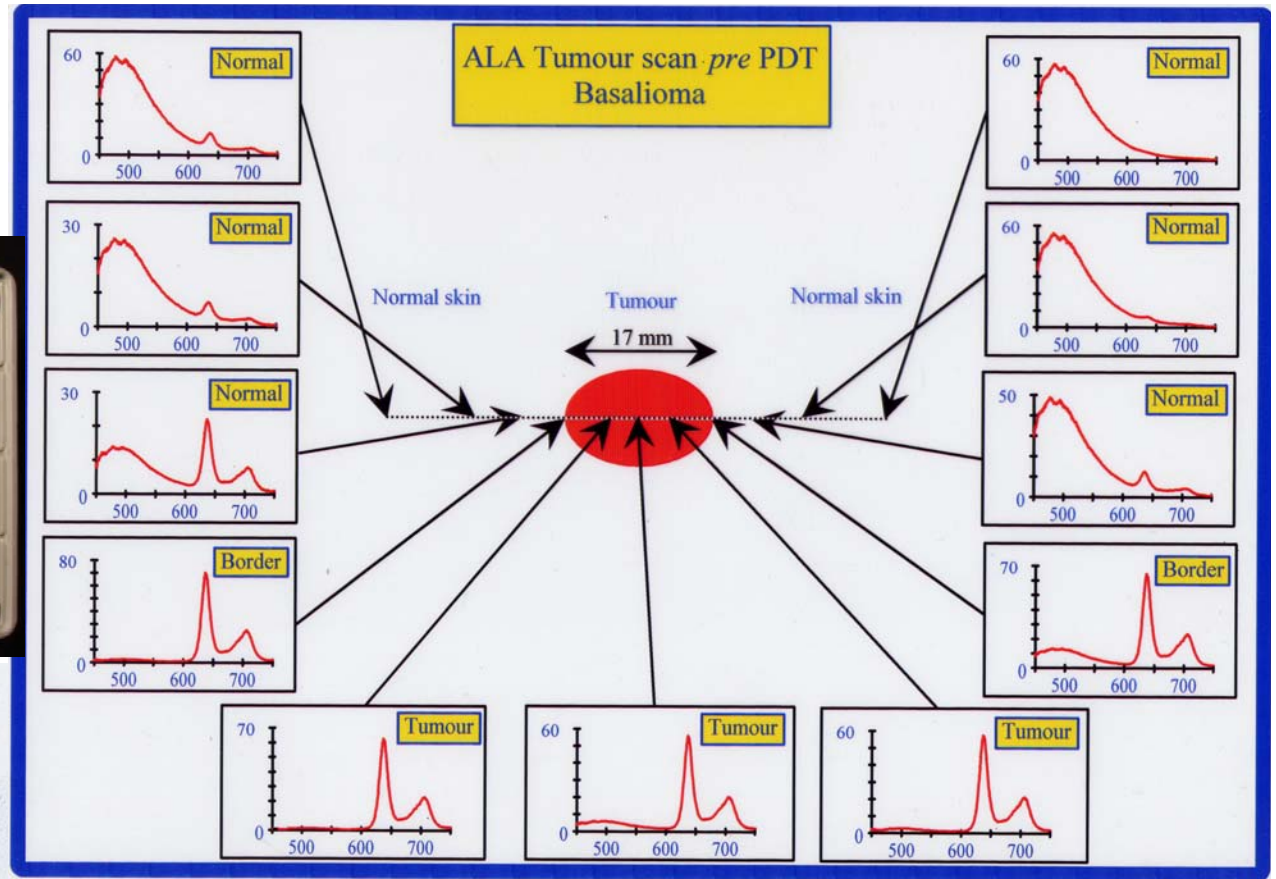
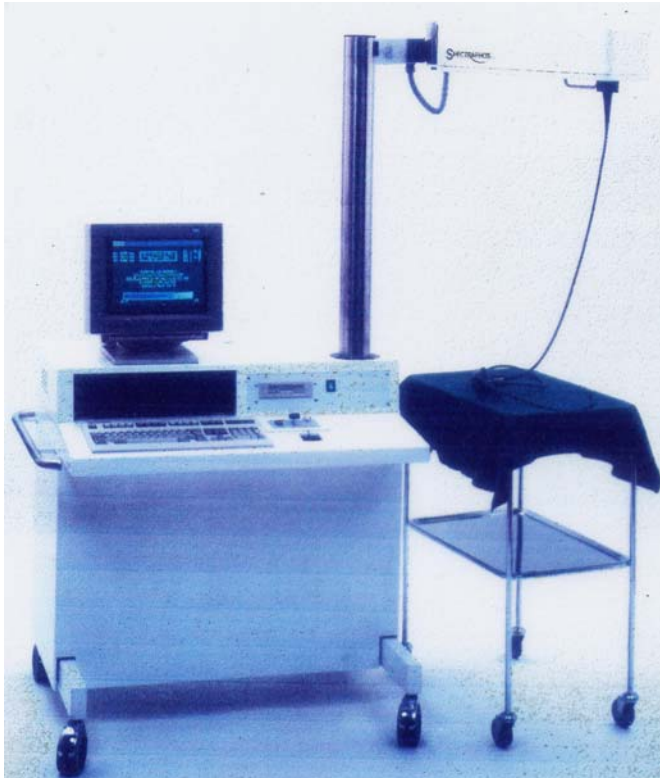
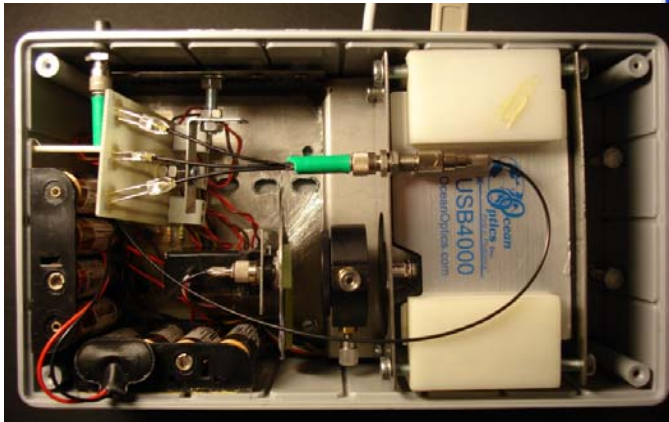


Interstitial Photodynamic Therapy

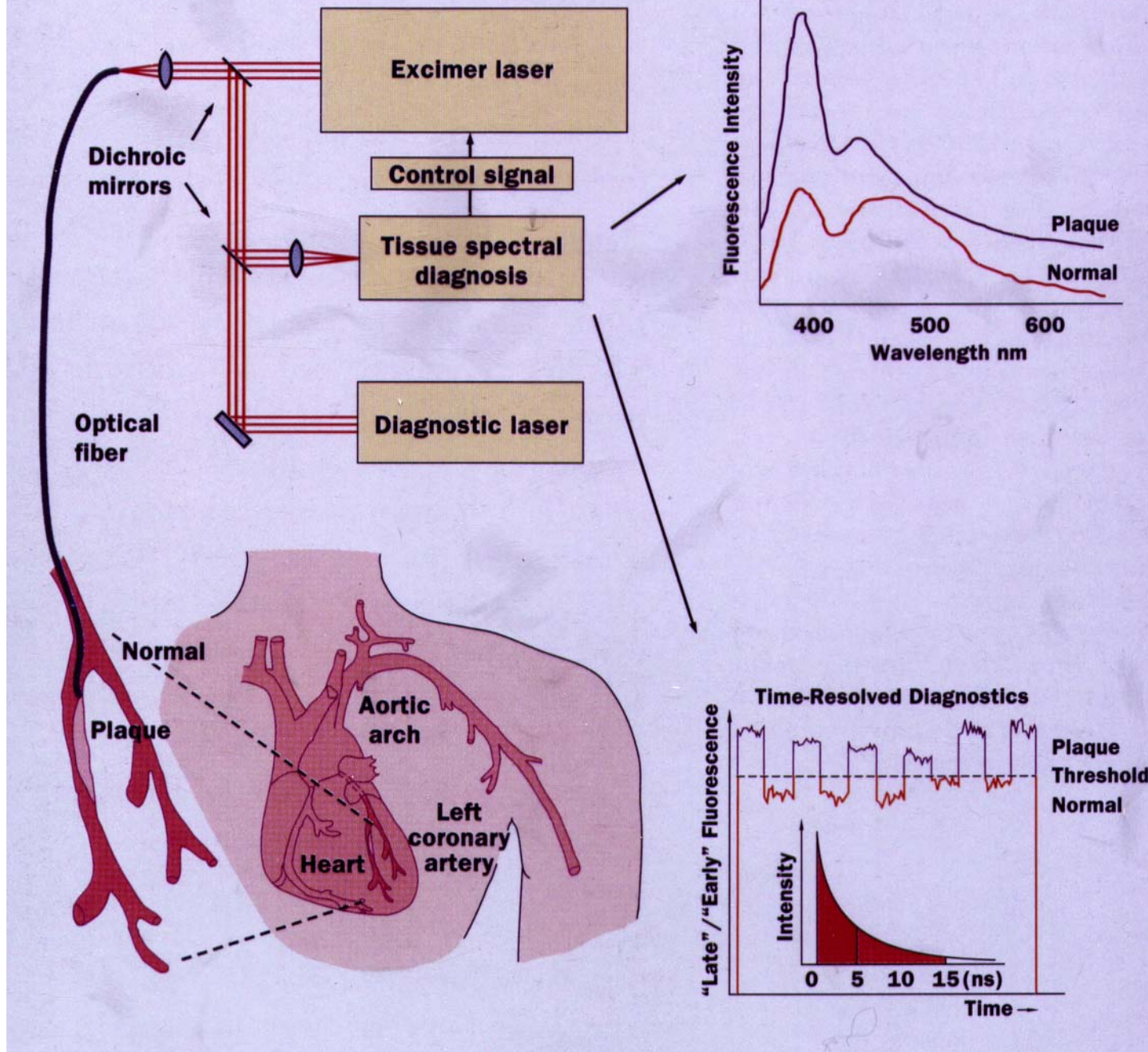
Prostate Cancer



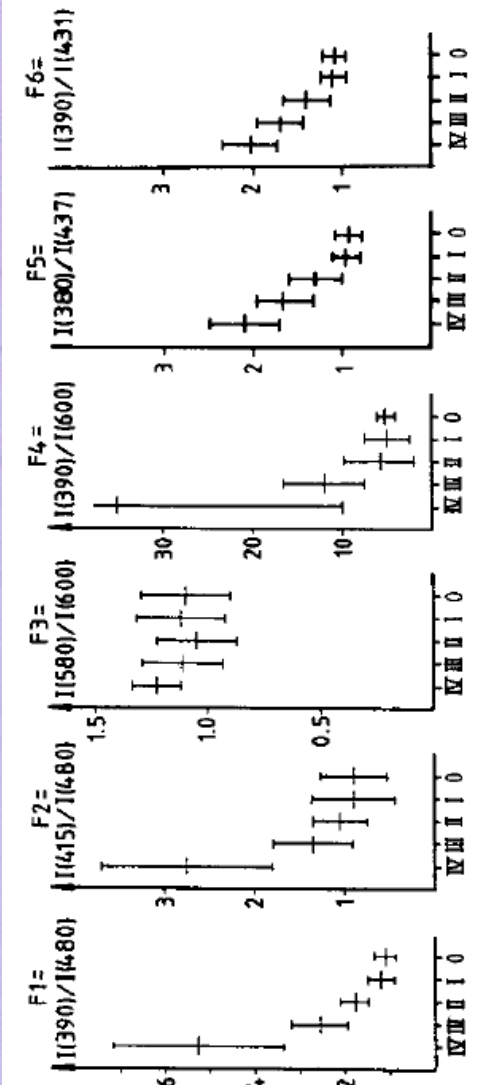
Fluorescence Diagnostics of Malignant Disease



Cardiovascular applications

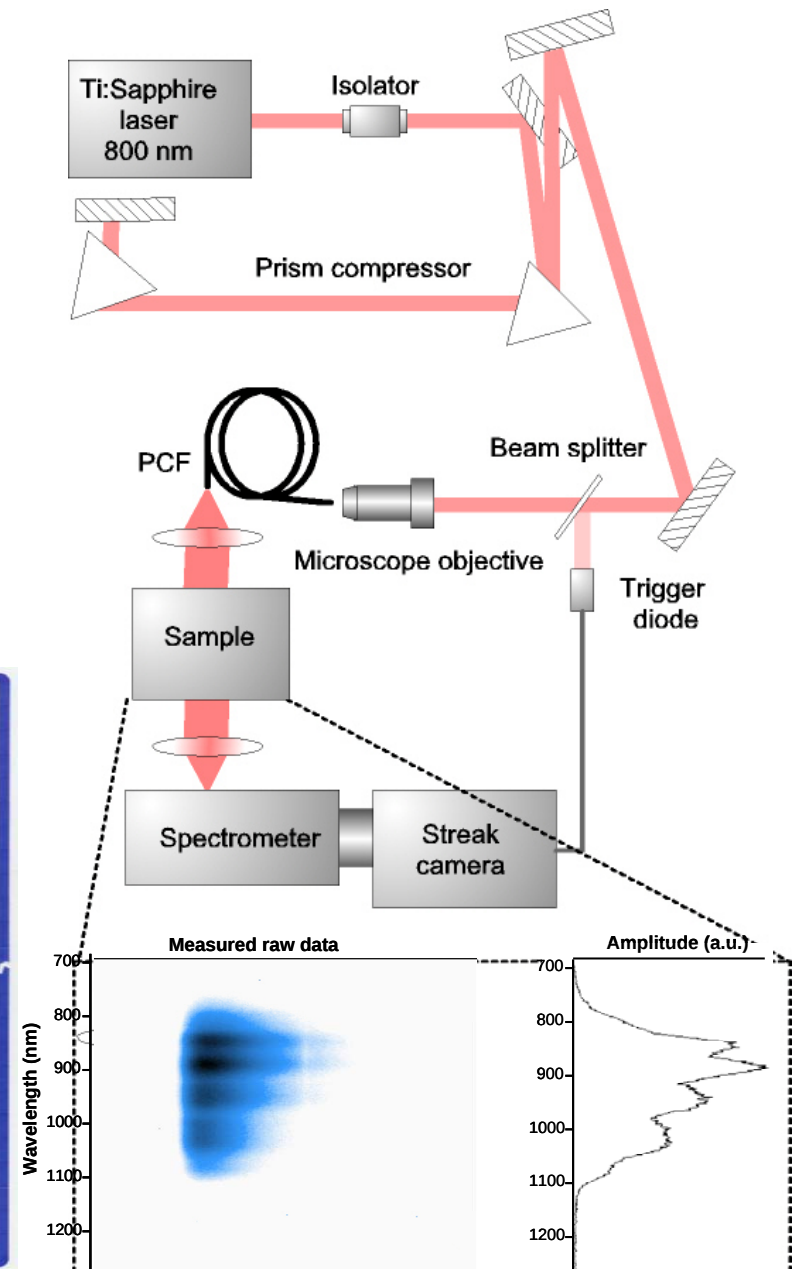
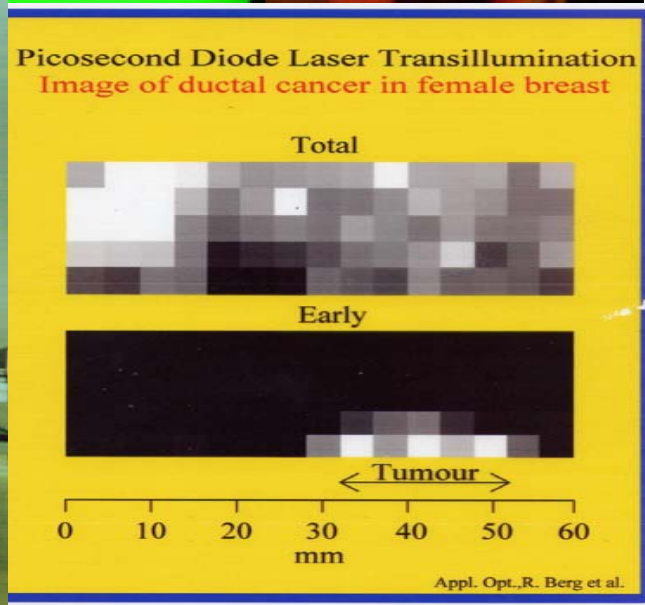
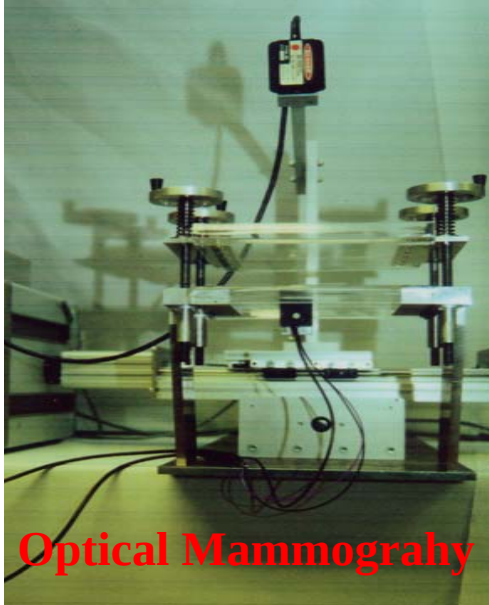
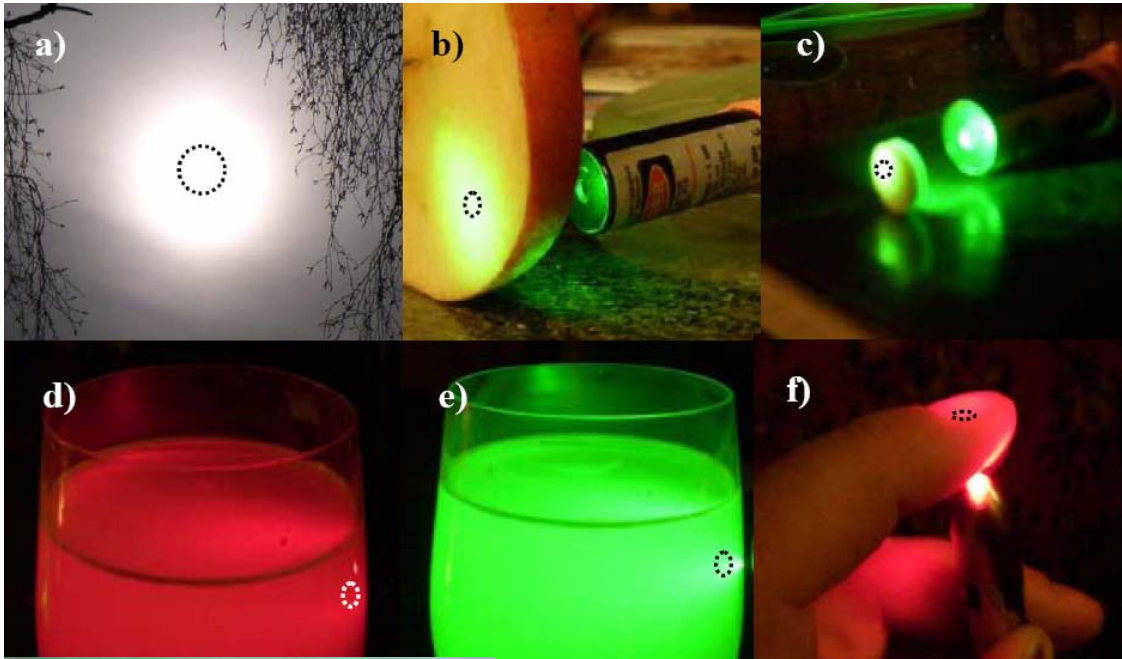


Vessel spectroscopic diagnostics



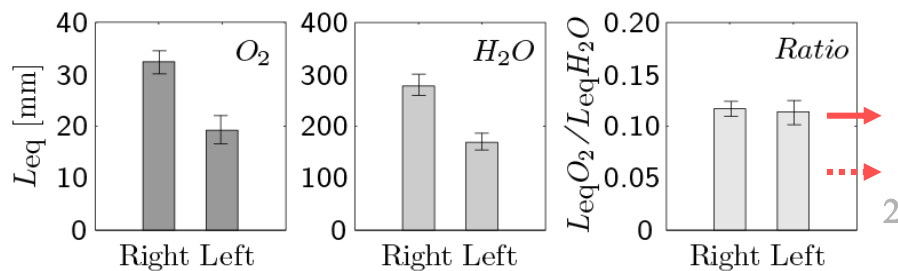
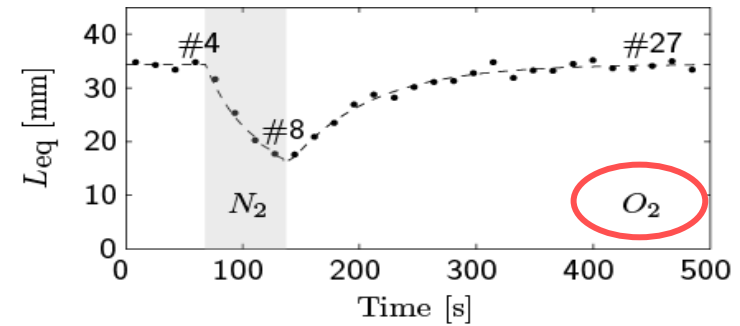
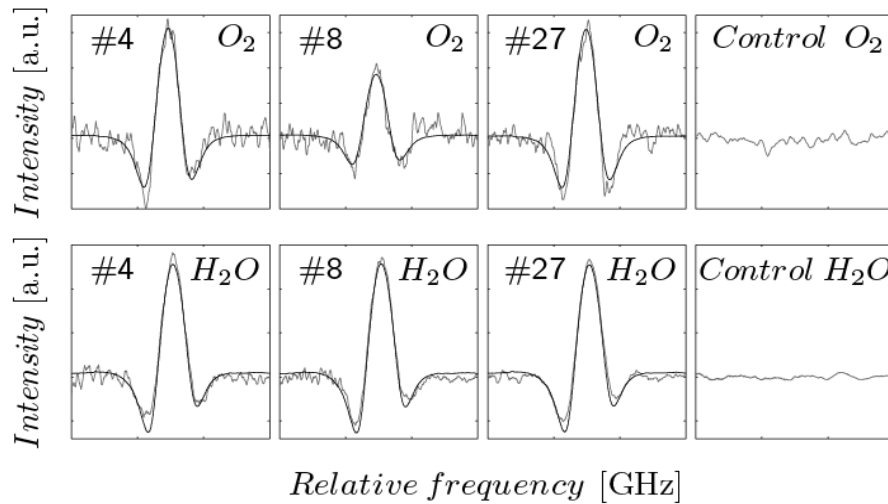
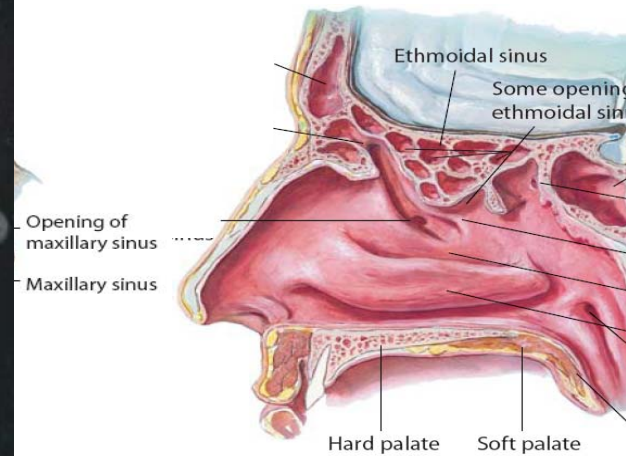
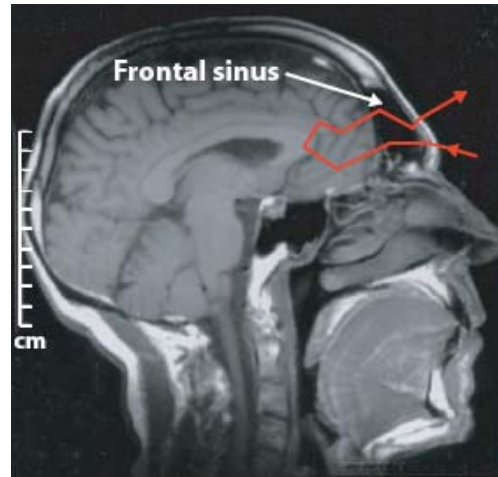
Optical Spectroscopy in Scattering Media

Mammography - Pharmaceuticals

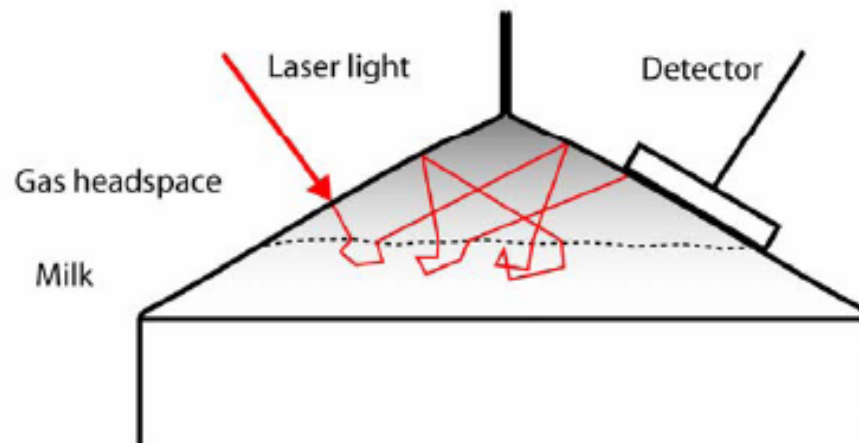


GASMAS

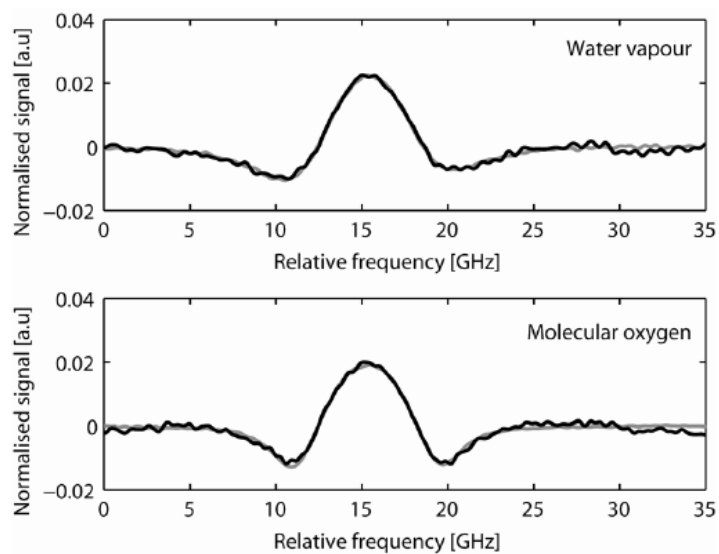
Sinusitis diagnostic by laser-spectroscopic measurement of oxygen and water vapour



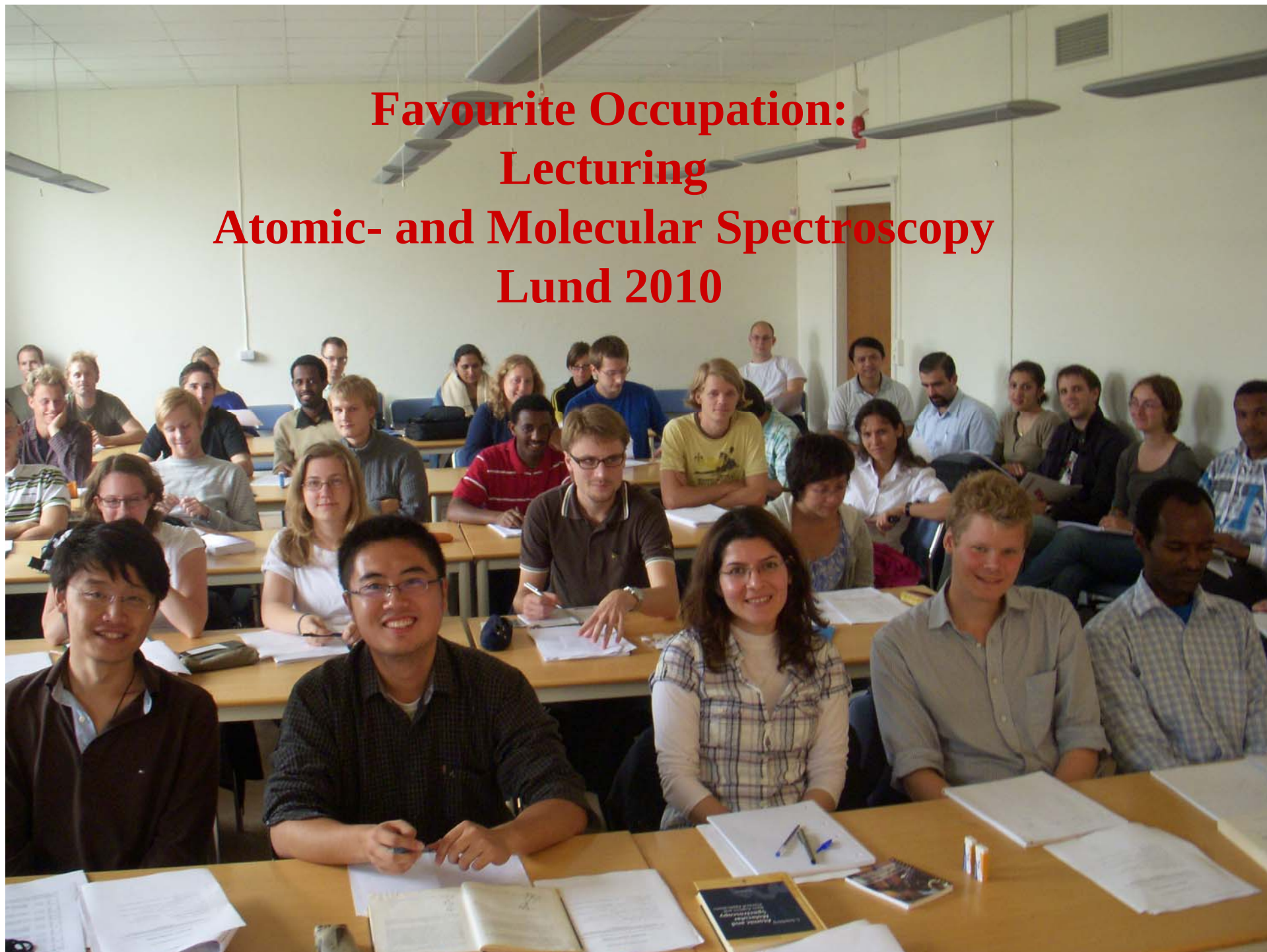
Food packaging



Lewander et al., Appl. Phys. B 2008



**Favourite Occupation:
Lecturing
Atomic- and Molecular Spectroscopy
Lund 2010**





Young people must get enthusiastic and carry science forward!

“Science and Innovation to Shape a Brighter Future”



Great Hall of the People, Beijing 2007



Jilin University 2004



HIT, Harbin 2006



Zhejiang University 2006

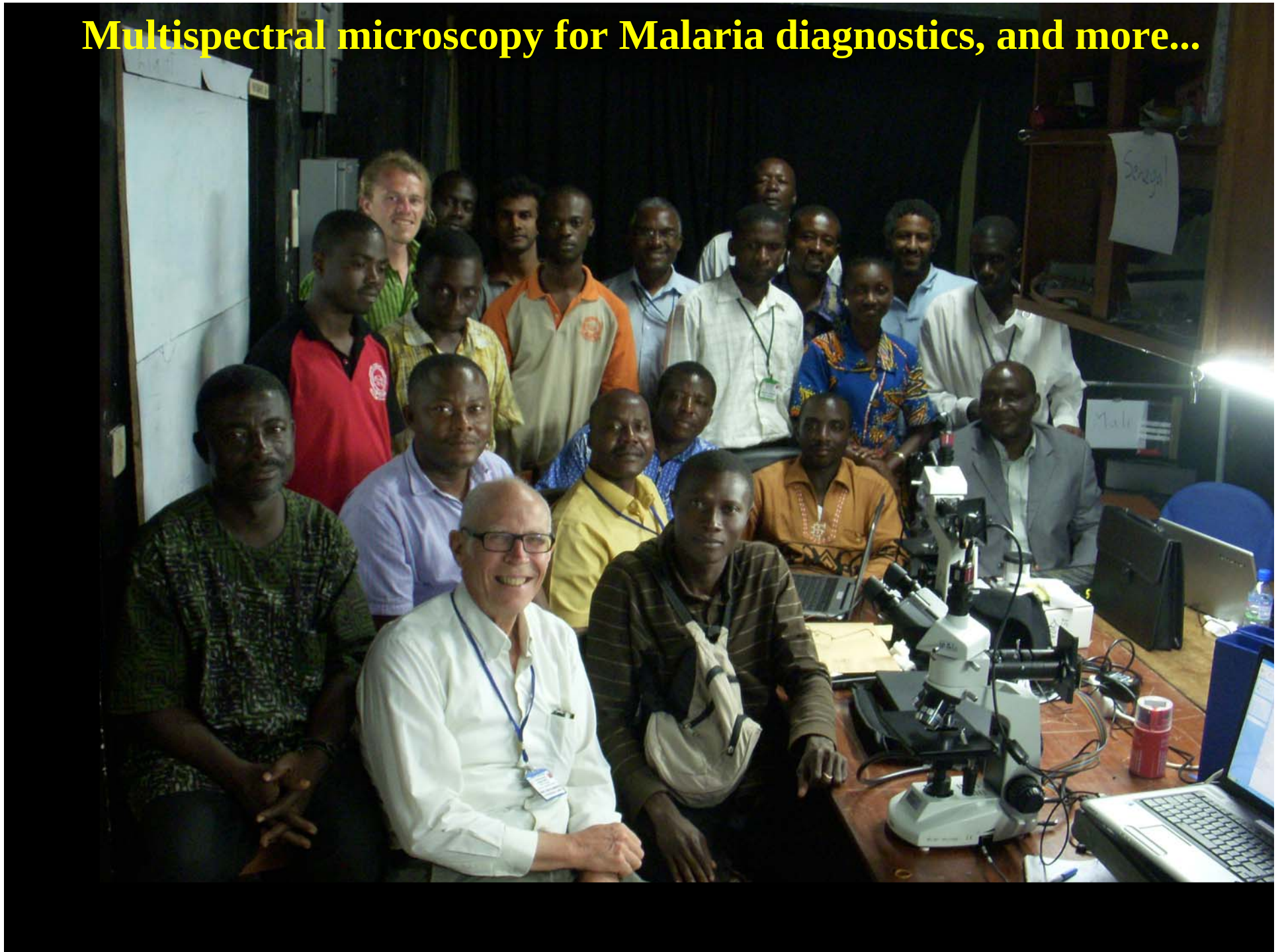


CAS, Beijing 2006

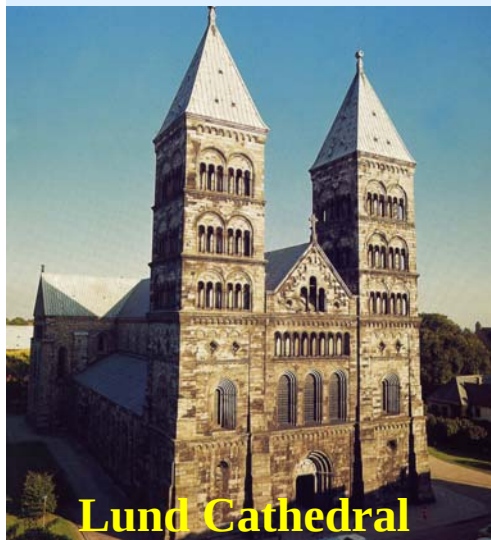


Cape Coast, Ghana 2010

Multispectral microscopy for Malaria diagnostics, and more...



One world – Many cultures

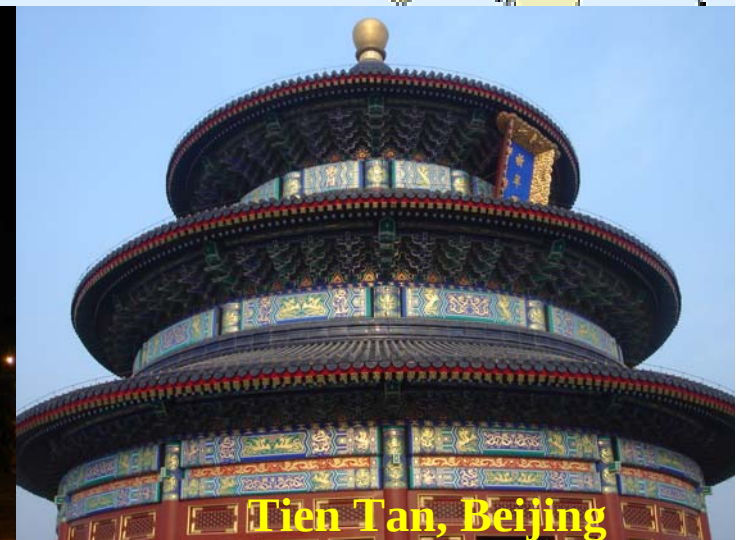


Lund Cathedral



Coliseum

Rome



Tien Tan, Beijing

Science mediates Freedom!

El Condor pasa
Andes, Peru

Science can help keeping the environment in shape !



Skärarid, Sweden



Jiu Zhai Gou

China



Hangzhou, China



Capri, Italy



My wishes:

**That Science and Technology
always would have the purpose
to shape a better World !**

**That you all will have
personal Happiness
and Success in your
work and lives !**

My thanks:

*Thanks, Ingvar Lindgren,
my teacher,
for putting trust in me, for support
and excellent working conditions
in Göteborg!*



*Thanks, all Colleagues and Collaborators,
for most fruitful and enjoyable
joint work through 43 years !*

*Thank you All for coming
to this Symposium !*

*Warmest thanks to the Organizers
of this Symposium!*

Göteborg and Lund Collaborators in Atomic Spectroscopy 1967 - 2010

G. Belin, K. Bathia, U. Berzinsh, C. Belfrage, H. Bergström,
S. Borgström, J. Carlsson, A. Dönzelmann, A. Ekers,
K. Fredriksson, M. Gaarde, S. Garpman, P. Grafström,
A. L'Huillier, Z.K. Jiang, Se. Johansson, G. Jönsson,
P. Jönsson, L. Kiernan, F.V. Kowalski, S. Kröll, J. Larsson,
C. Levinson, Z.S. Li, G. Lidö, I. Lindgren, J. Klavinsh,
X.T. Luo, H. Lundberg, C.Y. Luo, A.-M. Mårtenson, L. Nilsson,
G. Olsson, A. Persson, W. Persson, W. Schade, T. Starczewski,
C. Tillman, L. Stureson, A. Rosén, S. Rydberg, A. Sjögren,
C.G. Wahlström, D.D. Wang, H.L. Xu,
R. Zerne, Z.G. Zhang.

1975 - 2010

Göteborg and Lund Collaborators in Environmental Monitoring

J. Alnis, B. Anderson, M. Andersson, V. Avetisov, K. Barup,
L.O. Björn, M. Brydegaard, H. Edner, K. Fredriksson, B. Galle,
R. Grönlund, Z.G. Guan, U. Gustafsson, J. Hällström,
A. Johansson, J. Johansson, P. Kauranen, M. Lewander, C. Löfstedt,
I. Lindgren, P. Lundin, S. Montán, K. Nyström, P. Ragnarson,
A. Runemark, Y. Saito, J. Sandsten, J.N. Smith,
G. Somesfalean, A. Sunesson, E. Svensson, L. Unéus, S. Wallin,
E. Wallinder, P. Weibring,
M. Wellenreuther, S. Åkesson



LUND INSTITUTE OF TECHNOLOGY
Lund University

Collaborators in Combustion Diagnostics

**M. Aldén, P.E. Bengtsson, T. Högberg,
P. Kauranen, H. Hertz, G. Holmstedt, S. Wallin,
W. Wendt, U. Westblom**

1982 - 2010

Lund Collaborators in Biomedical Optics

M. Andersson, S. Andersson-Engels, J. Ankerst, J. Axelsson,
B. Bauer, N. Bendsoe, R. Berg, M. Brydegaard,
A. Enejder, K. Herrlin, O. Jarlman, D. Killander,
C. af Klinteberg, S. Mattsson, J. Johansson, B.-A. Jönsson,
S.-E. Karlsson, L. Kjellén, M. Lewander, L. Eker,
M. Grätz, Z.G. Guan, A. Gustafsson, K. Jakobsson,
A. Johansson, S. Lindberg, S. Lundquist, S. Montán,
C. Olsson, M. Olivo, L. Persson, A. Pifferi, S. Pålsson, L. Rippe,
L.G. Salford, R. Siemund, G. Somesfalean, U. Stenram,
J. Swartling, P. Svenmarker, S. Strand, K. Svanberg,
G. Svahn, T. Svensson, C. Tillman,
I. Wang, C.G. Wahlström



LUND INSTITUTE OF TECHNOLOGY
Lund University

1967 – 2010

International Collaborators

L. Alberotanza, F. Albert, L. Baert, R. Bargagli, E. Biémont,
K. Blagoev, P. Buah Bassuah, H. Bucka, R. Byer, T. Caltabiano,
G. Cecchi, R. Cioni, C. Conti, R. Cubeddu, R. Danelius,
A. Deriabo, J. Farley, R. Ferrara, E. Fill, G. Faris, V. Fivet,
H. Garnir, S. Gräfe, R. Gupta, A. d'Hallewin, W. Happer,
T. Hawkins, G. Jori, H. Kristmansdottir, S.L. He, W. Hill,
M. Horvath, T.W. Hänsch, J. Kapostins, J. Kotnik, R. Lacy,
H. Lichtentaler, G. Malchova, R. Mayo, E. Maserti, D. Lognoli,
P. Mazzinghi, L. Mei, J. Ney, V. Raimondi, J. Spigulis,
J. Steingruber, P. Palmeri, L. Palombi, L. Pantani, V. Penchev,
A. Piskarskars, P. Quinet, R. Repnow, A.L. Schawlow,
V. Sirutkaitis, P. Taroni, P. Tsekeris, A. Vaitkuviene, A. Wague,
T.Y. Yan, P.L. Zhang, J. Zuoue

Special thanks to Present Group:

**A. Bruzelius, M. Lewander,
M. Brydegaard, Z.G. Guan,
H. Jayaweera, P. Lundin,
L. Mei, A. Merdasa,
G. Somesfalean, J. Ålebring**

**Warmest thanks to my Family
for Love and Endurance !**



**Allt har Han gjort skönt för sin tid,
Ja, han har ock lagt evigheten
i människornas hjärtan
Predikaren 3:11**

**He has made everything beautiful in
its time. He has also set eternity in
the hearts of men
Ecclesiastes 3:11**



**Tack Gud för Livets Gåva och för Din Uppehållande Kärlek !
Thanks, God, for the gift of Life and for Your persistent Love!
Yours is the Glory for Ever!**





Thank you all !