inarIndustriali 2018 - April 10, 2018

HZ PER APPLICAZIONI
CIENTIFICHE E TRASFERIMENTO
ECNOLOGICO

IN

Istituto Nazionale di Fis
Laboratori Nazionali

I Laboratori Nazionali di Frascati sono lieti di invitare
all'evento

Giorgio Salvini e i Laboratori Nazionali di Frascati

Inaugurazione dell'aula intitolata all'artefice della nascita dei Laboratori
Martedì 24 aprile 2018 ore 10
Auditorium B. Touschek

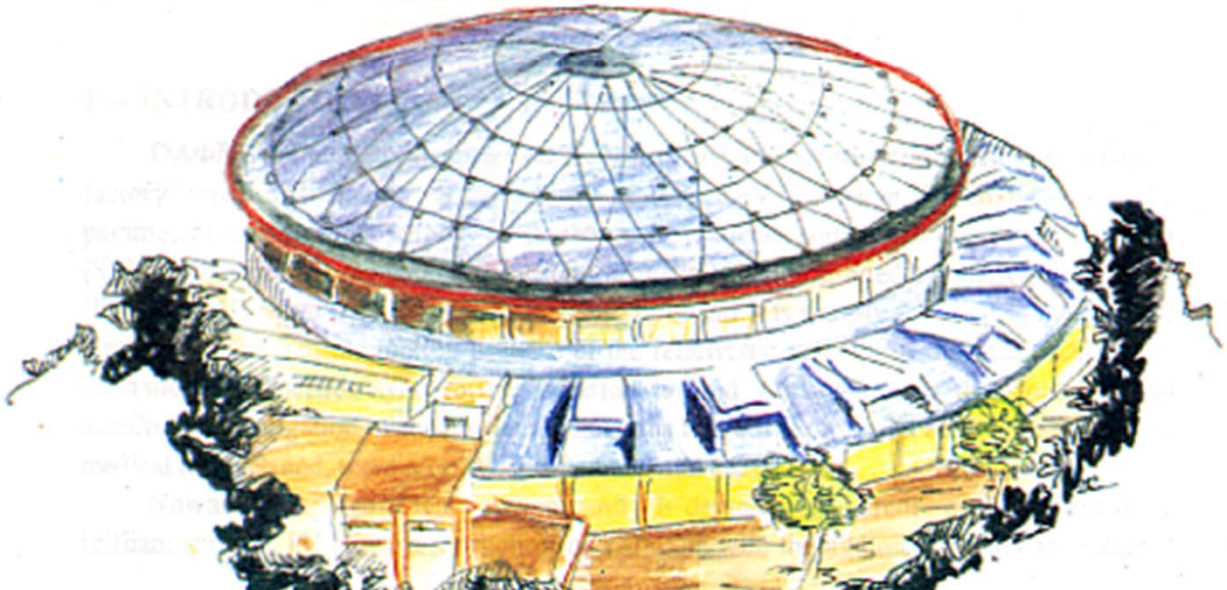
Il Direttore
Pierluigi Campan

dita conferma di partecipazione
agenda.infn.it/event/salvini2018

LNF–93/027 (IR)
14 Giugno 1993

A. Marcelli, P. Calvani:

DAΦNE - A NEW TUNABLE AND INTENSE SOURCE OF SYNCHROTRON RADIATION IN THE INFRARED DOMAIN



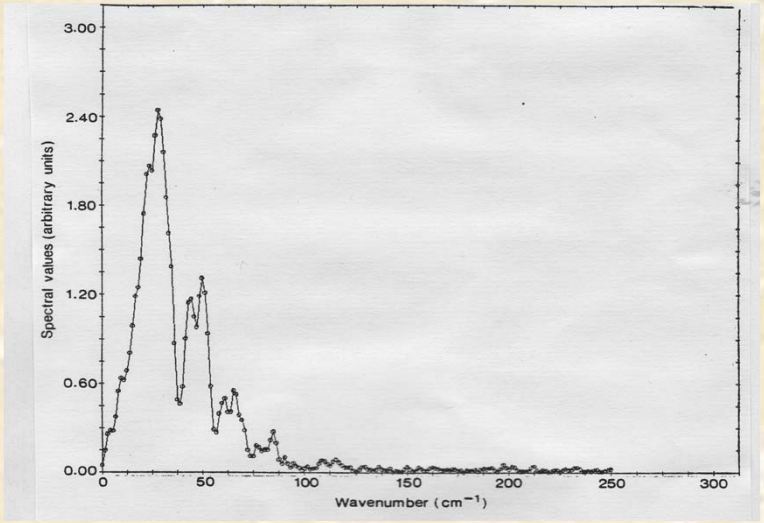
n Nov. 1981 First observation of a FIR photon beam

1982 Long term shut down due to mirror damage)

.1984 Resume of the experimental activity

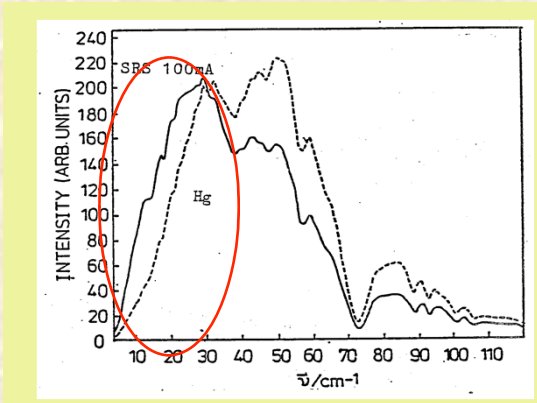
roof of **high brightness of *SR*** over thermal lamps

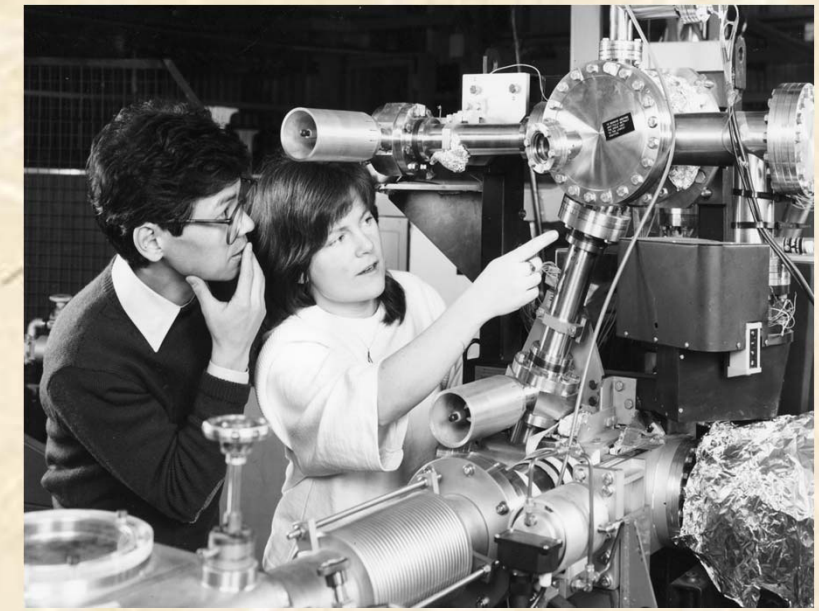
First record of an interferogramme



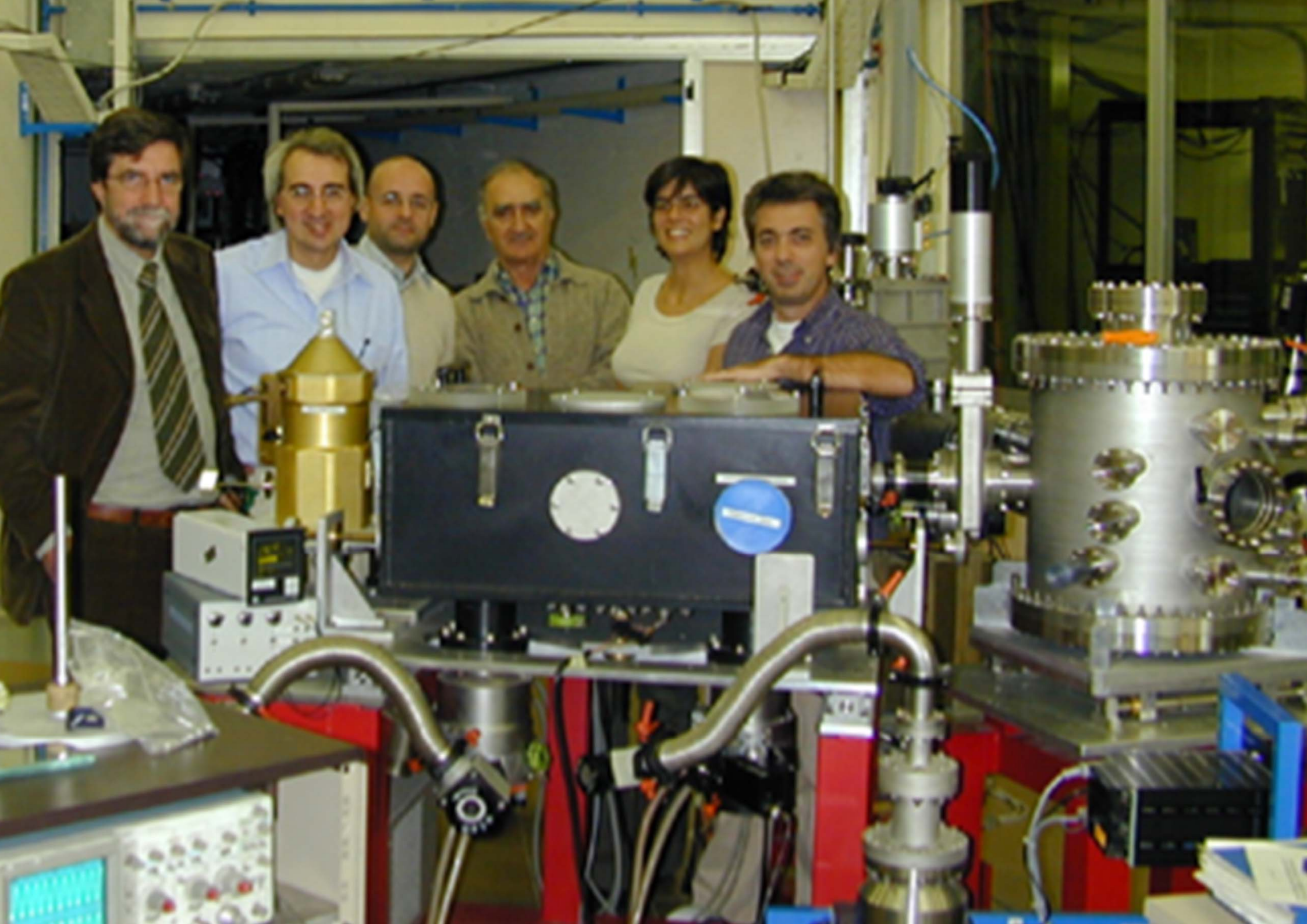
a T. Shuttlewort

ncan and J. Jarwood





Nanba & Margarett on BL13@SRS



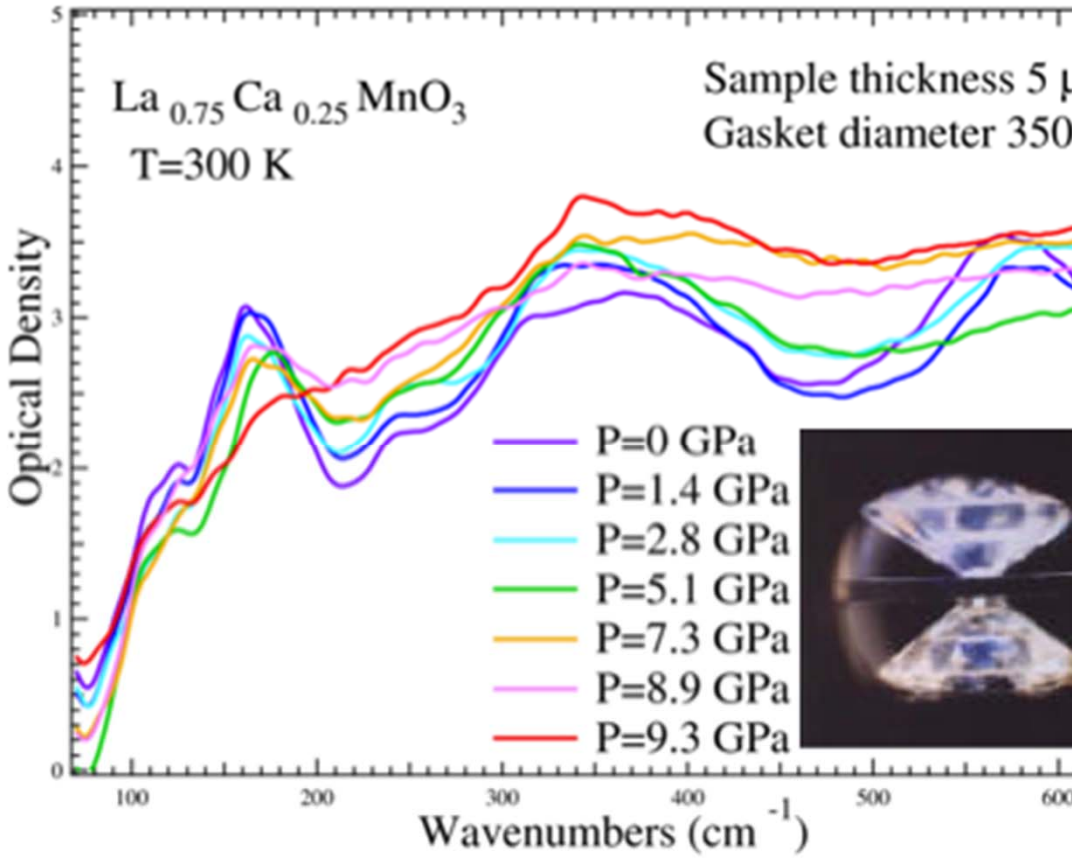

MAX-lab
SRS
CCLRC
diamond
IRIS
BESSY
SOLEIL
SYNCHROTRON
ANKA
PAUL SCHERRER INSTITUT
PSI
ESRF
elettra
INFN
Laboratori Nazionali di Frascati

far-IR experiments
$a_{0.75}Ca_{0.25}MnO_3$

A. Sacchetti,[1] M. Cestelli Guidi,[2] E. Arcangeletti,[1] A. Nucara,[1] P. Calvani,[1] M. Piccinini,[2] A. Marcelli,[2] and P. F
[1]"Coherentia" CNR-INFM and Dipartimento di Fisica, Università di Roma La Sapienza, Piazzale Aldo Moro 2, I-00185 R
[2]Laboratori Nazionali di Frascati—INFN, Via E. Fermi 40, 00044 Frascati, Italy
(Received 3 August 2005; published 24 January 2006)

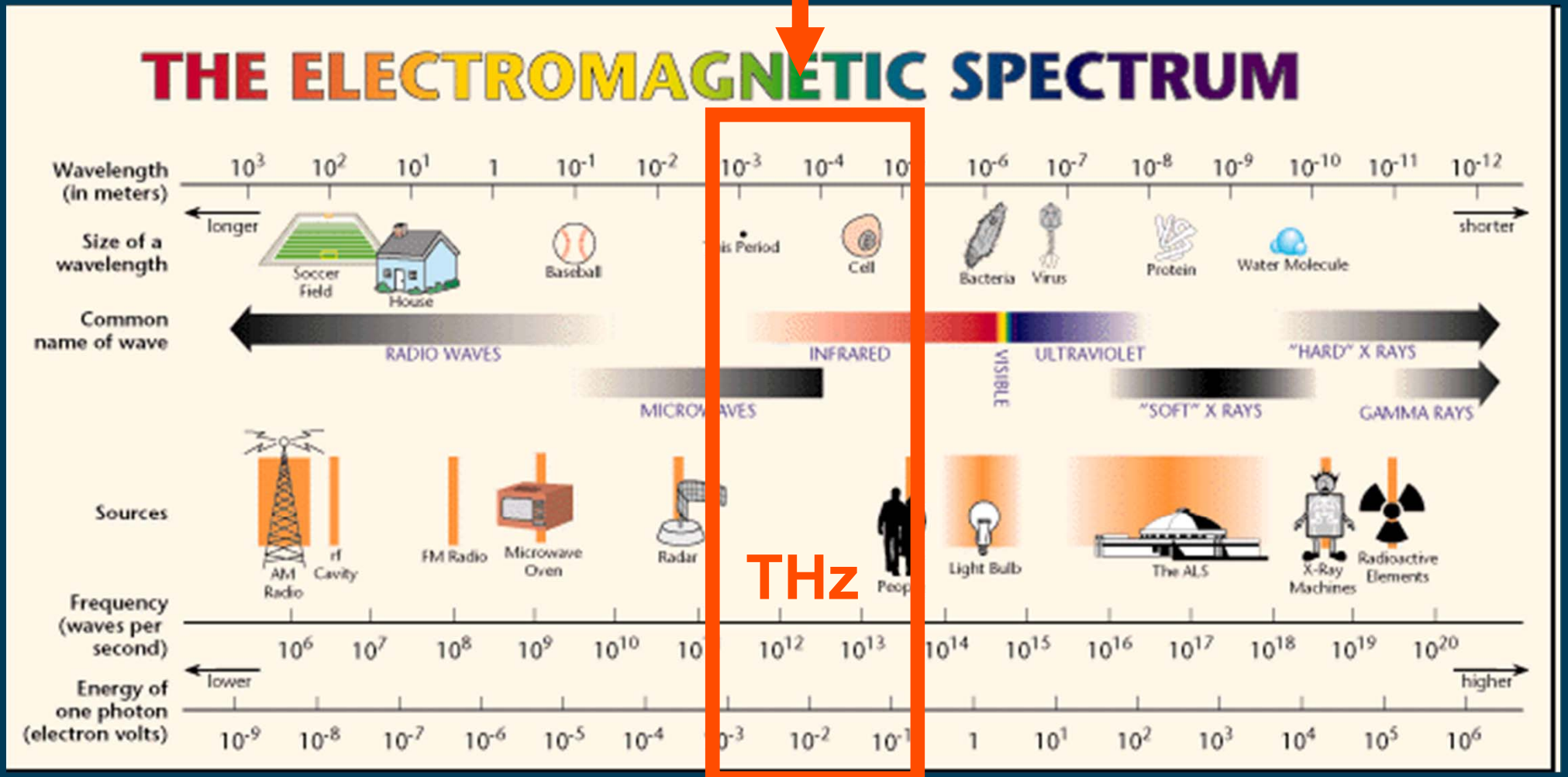
The first far-infrared absorption spectra of manganite samples at pressures P up to 10 GPa were obtained on $La_{1-x}Ca_xMnO_{3-y}$ by use of synchrotron radiation. For $x = 0.25$ and 0.20 ($y = 0$), P promotes partial metallization at room temperature through a strong reduction of the insulating gap. An $x = 0.20$ sample with $y = 0.08$ does not show any charge delocalization effect up to 10 GPa. An Urbach-like model of disordered Jahn-Teller wells is shown to well fit the far-infrared band edge and allows one to obtain a reliable pressure dependence of the energy gap.

DOI: 10.1103/PhysRevLett.96.035503 PACS numbers: 63.20.Kr, 62.50.+p, 71.30.+h, 78.30.−j



lossal Magnetoresistance

The THz Gap (0.3 – 20 THz)



tronics ← → Photo

1 THz ~1 ps ~300 μm ~33 cm^{-1} ~4.1 meV ~47.6 K

Military

Homeland Security

Medical

Pharma

Aerospace

Industrial

Terahertz & Extreme Gigahertz frequency Applications (One Million Megahertz)

Astronomy

- Orbital and ground based study of cold interstellar molecular clouds of singly ionized nitrogen and carbon monoxide -contributing to early galactic formation


ESA -Herschel Spacecraft

Remote Sensing

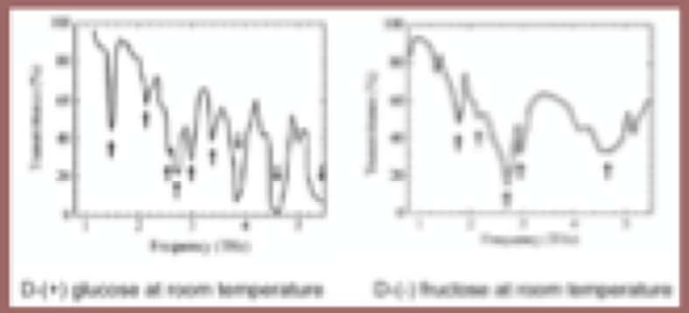
- Atmospheric sensing of pollutants and composition

Medical Imaging

- Penetrates non polar materials, skin and soft tissue
- may be a safe X-Ray replacement

Materials Analysis

- THz frequencies interact aggressively with polar molecules (water), most molecules have vibration and rotational emission and absorption spectral


D-(+) glucose at room temperature D-(-) fructose at room temperature

Security

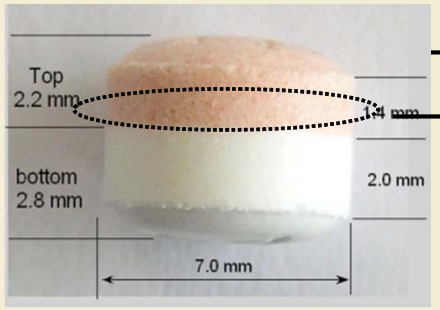
- Terahertz detectors can now detect passive emissions from human bodies and objects hidden within clothing
- Terahertz scanners can penetrate sealed packages
- Return spectra can identify material composition (spectral fingerprint)

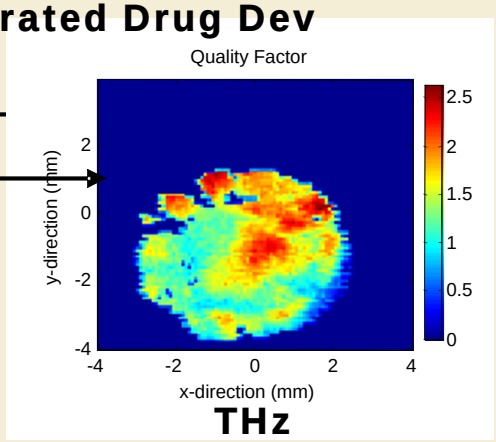

Terahertz Imaging 100 Gigahertz

Indoor and Terrestrial Wireless LANs (10-100+ Gbps)

- Radio tags (ZigBee)
- Intelligent home device interface
- Personal Space Broadband Networks

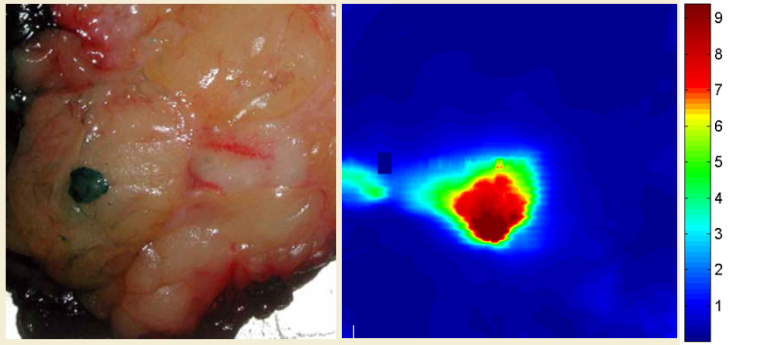
Safe Tablets & Accelerated Drug Dev





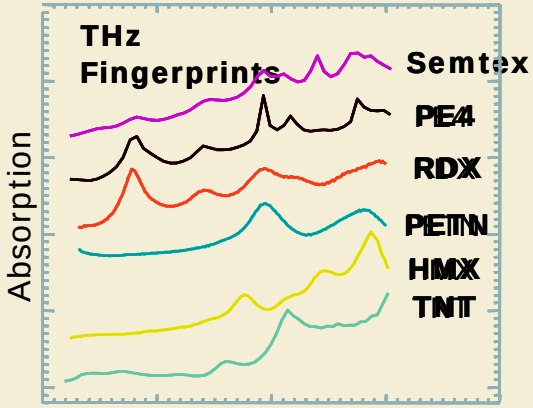
Visible THz

Detecting Cancer

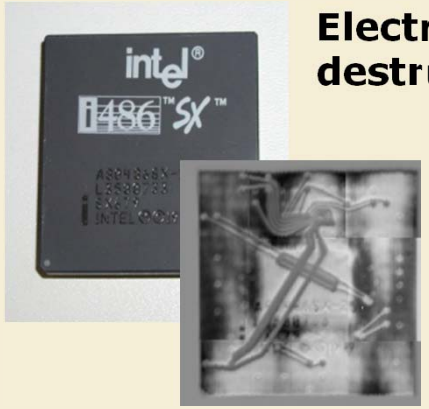


Visible THz

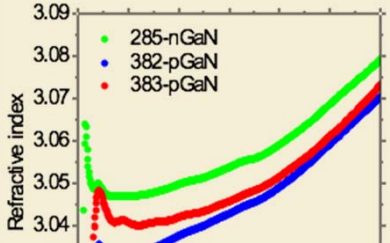
Detecting Explosives



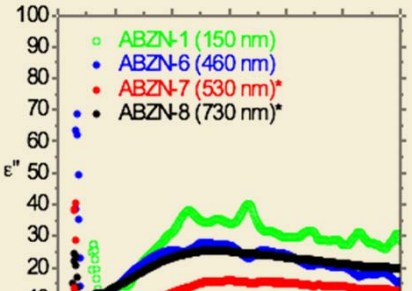
Electronics QA & non destructive testing



Materials characterization



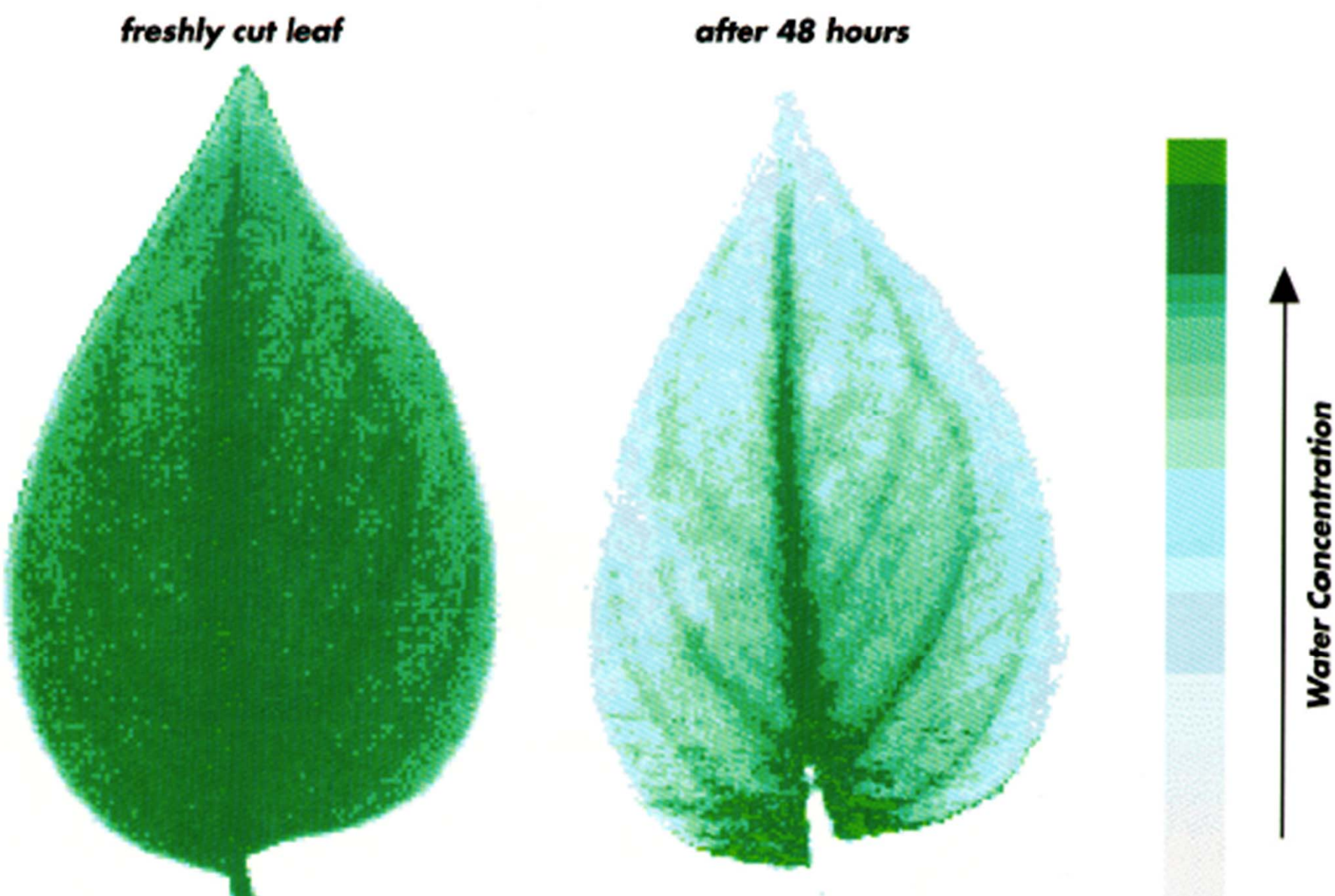
High frequency measurements

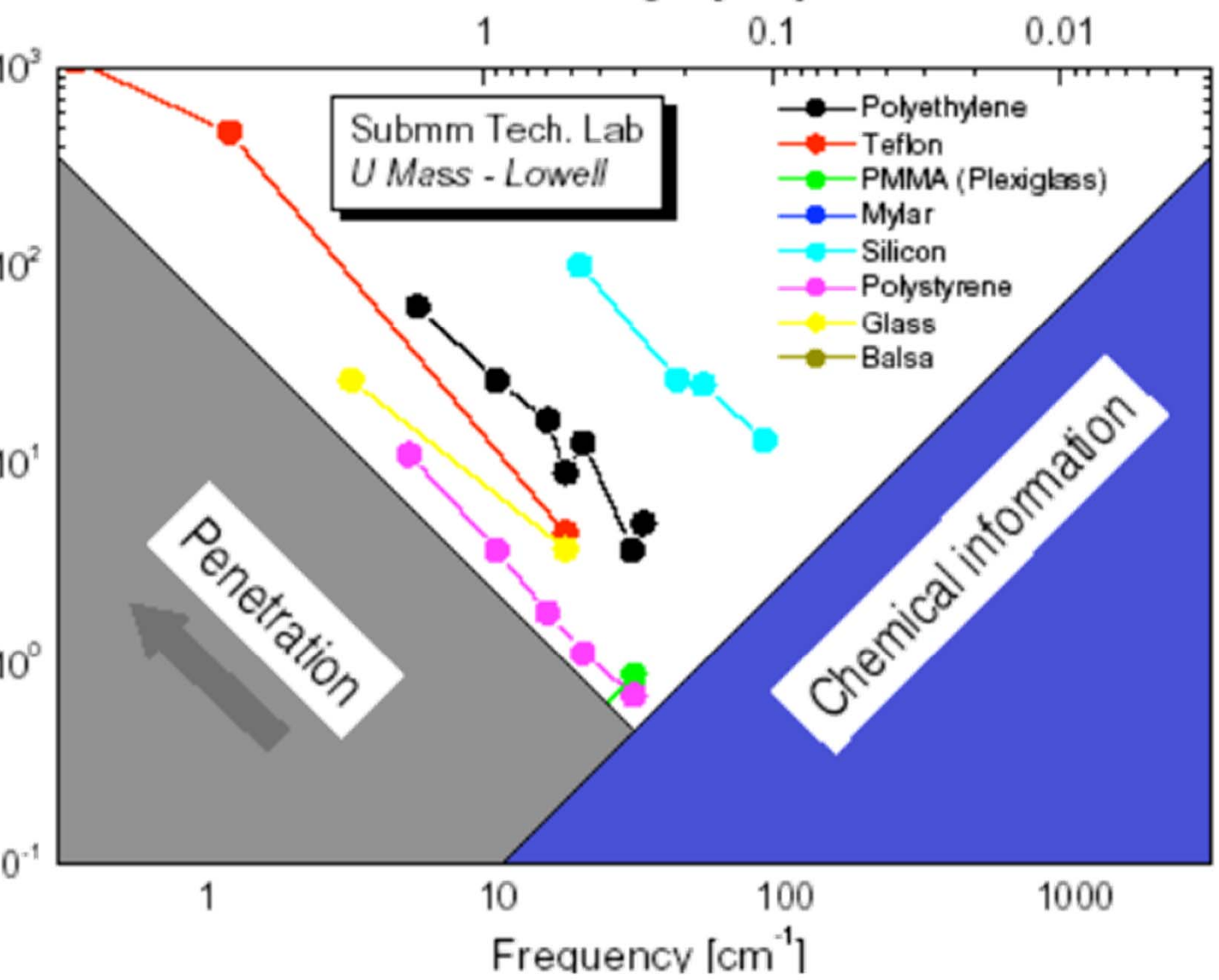


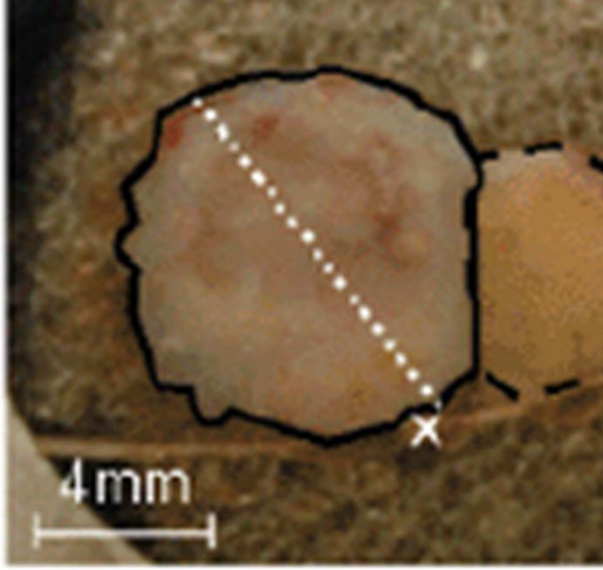
Imaging with terahertz waves

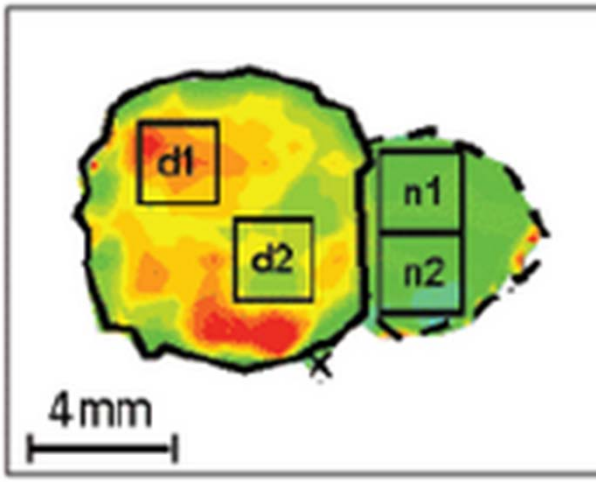
B. B. Hu and M. C. Nuss

AT&T Bell Laboratories, 101 Crawfords Corner Road, Holmdel, New Jersey 07733-3030









Advantages of THz imaging:

on-ionising radiation (at variance with X-rays techniques);

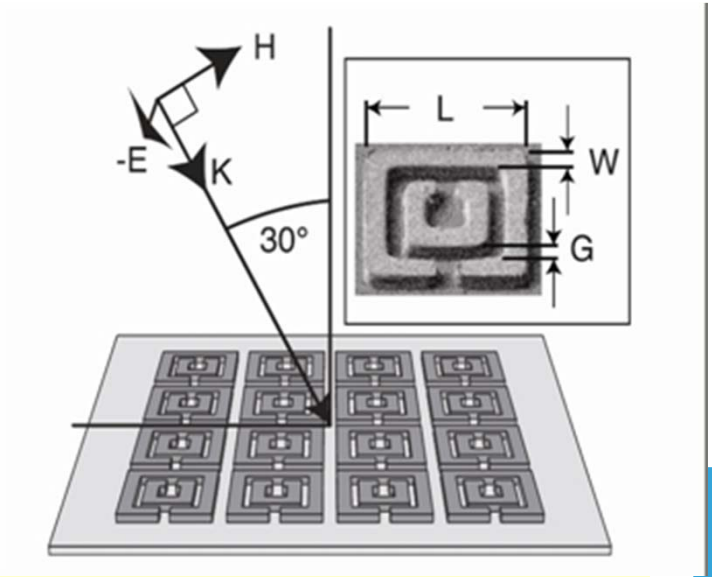
n situ analysis;

ood penetration in many materials (comparable with X-ray and

bility

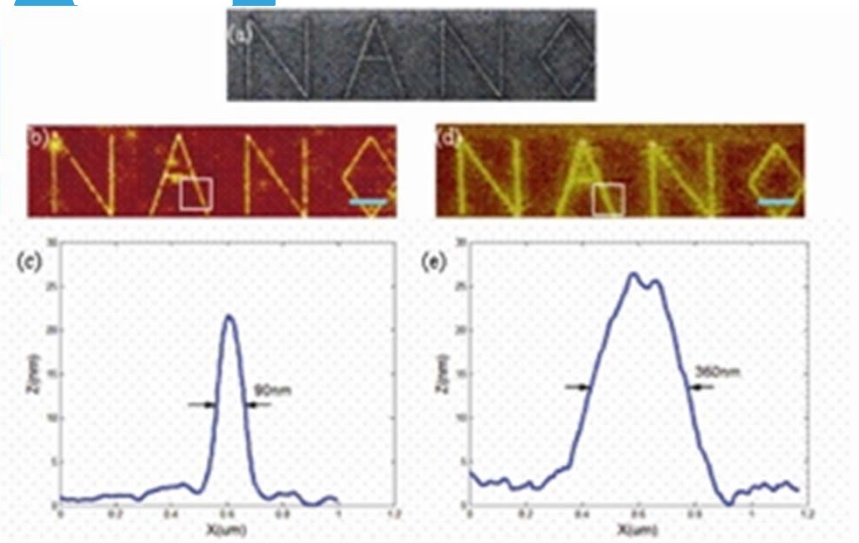
Applications

THz



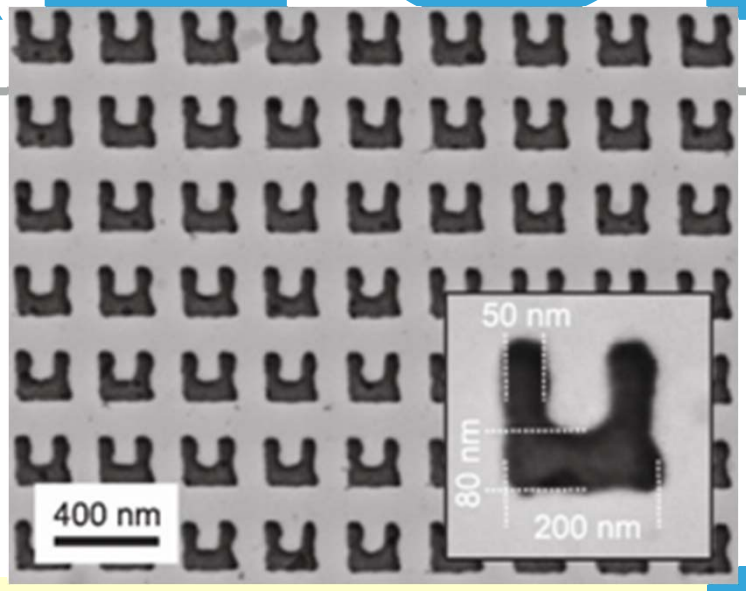
Yen *et al.*, *Science* **303**, 1494 (2004).

Super lens



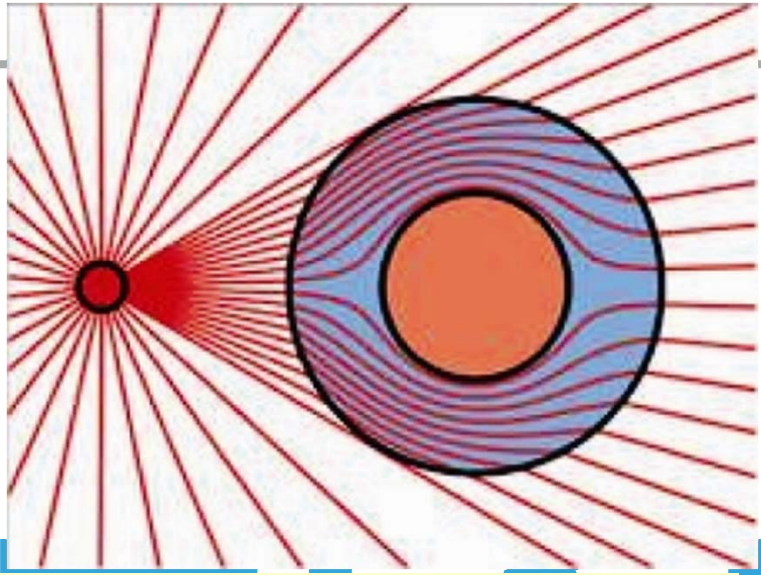
Fang *et al.*, *Science* **308**, 534 (2005)

NIR



Enkrich *et al.*, *PRL* **95**, 203901 (2005)

Cloaking



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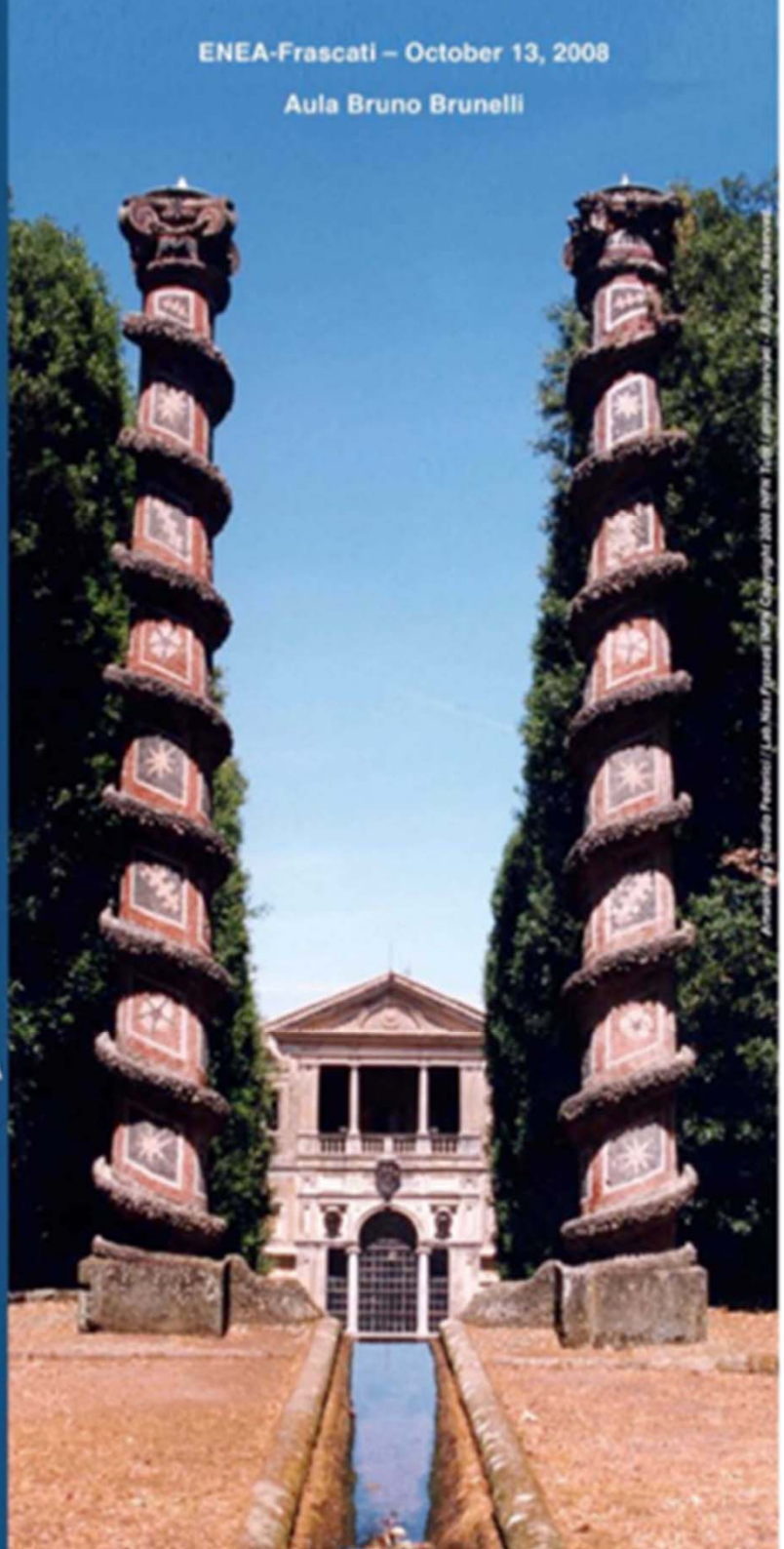
for research
he Terahertz region

ENEA-Frascati – October 13, 2008

Aula Bruno Brunelli



INFN & ENEA 2008

Topical Review

The 2017 terahertz science and technology roadmap

S S Dhillon[1], M S Vitiello[2], E H Linfield[3], A G Davies[3], Matthias C Hoffmann[4], John Booske[5], Claudio Paoloni[6], M Gensch[7], P Weightman[8], G P Williams[9], E Castro-Camus[10], D R S Cumming[11], F Simoens[12], I Escorcia-Carranza[11], J Grant[11], Stepan Lucyszyn[13], Makoto Kuwata-Gonokami[14], Kuniaki Konishi[14], Martin Koch[15], Charles A Schmuttenmaer[16], Tyler L Cocker[17], Rupert Huber[17], A G Markelz[18], Z D Taylor[19], Vincent P Wallace[20], J Axel Zeitler[21], Juraj Sibik[21], Timothy M Korter[22], B Ellison[23], S Rea[23], P Goldsmith[24], Ken B Cooper[25], Roger Appleby[26], D Pardo[23], P G Huggard[23], V Krozer[27], Haymen Shams[28], Martyn Fice[28], Cyril Renaud[28], Alwyn Seeds[28], Andreas Stöhr[29], Mira Naftaly[30], Nick Ridler[30], Roland Clarke[31], John E Cunningham[3,33] and Michael B Johnston[32,33]

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[13] Department of EEE, Centre for Terahertz Science and Engineering, Imperial College London, London, UK

[14] Department of Physics, University of Tokyo, Tokyo, Japan

[15] Faculty of Physics and Material Sciences Center, Philipps-Universität Marburg, Marburg D-35032, Germany

[16] Department of Chemistry and Energy Sciences Institute, Yale University, 225 Prospect Street, P.O. Box 208107, New Haven, Connecticut 06520-8107, USA

Final Program

SATT NORD

GDR NANO THz-MIR

cnrs

Université de Lille 1 SCIENCES ET TECHNOLOGIES

iemn Institut d'Electronique, de Microélectronique et de Nanotechnologie

ARMIR Association Rayonnement Millimétrique Industrie Recherche

lpca Laboratoire de Physico-Chimie de l'Atmosphère

Université du Littoral - Côte d'Opale (ULCO)

WHAT HAPPEN IN FRAN

2017

RAZIE

THANKS

Terahertz is a band of frequencies between microwaves and the far infrared