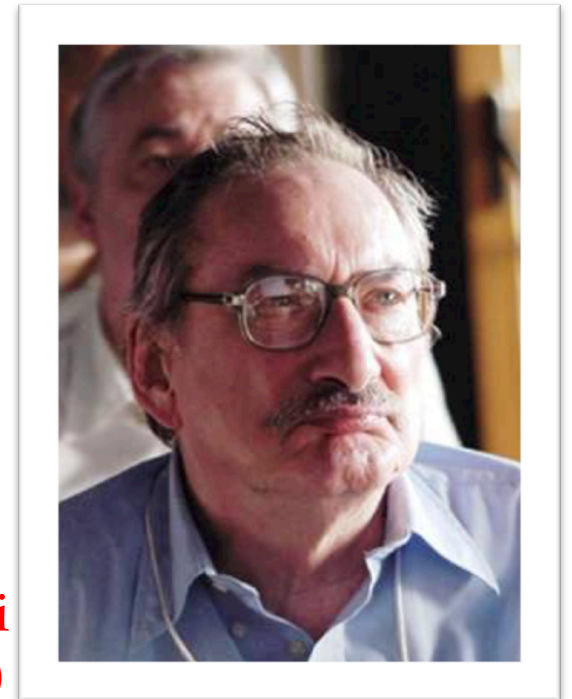


Fisica e Fisici a Pisa nel Novecento

**Condensed Matter Theory
at Scuola Normale Superiore
1980-2000**



Franco Bassani
(since 1980)



Mario Tosi
(since 1991)



Adriano Gozzini (at SNS since 1985) establishes the Polvani laboratory



Mario Tosi, Gabriele Giuliani and Franco Bassani, 1976 (courtesy of Erio Tosatti)

1980-1991 faculty in condensed matter theory (and cognate disciplines)

- Renato Colle (1981-1991)
physical chemistry
- Giancarlo Calvanese Strinati (1986-1991)
condensed matter theory
- Francesco Pegoraro (1983-1990)
theoretical plasma physics
- Franco Strocchi (1981-1984 and 1994-)
quantum field theory
- Sergio Caracciolo (1981-1993 and 1996-2001)
statistical mechanics

*plus tens of students,
post-docs,
research associates and
visiting scholars !*

Electronic states and optical transitions in solids (F. Bassani and G. Pastori-Parravicini, 1975)

Two-photon transitions

IL NUOVO CIMENTO

VOL. 1 D, N. 4

Luglio-Agosto 1982

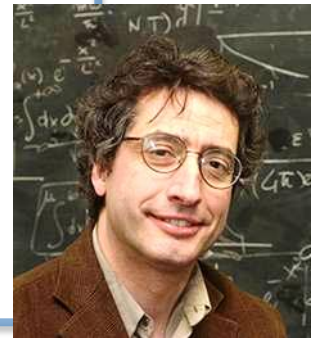
Two-Photon Transitions in Two-Electron Systems: the 1^1S-2^1S Transition in ^2He (*).

F. BASSANI

*University of Illinois at Urbana-Champaign - Urbana, Ill. 61801, U.S.A.
Scuola Normale Superiore - Pisa, Italia*

G. VIGNALE (**)

Scuola Normale Superiore - Pisa, Italia



VOLUME 50, NUMBER 17

PHYSICAL REVIEW LETTERS

25 APRIL 1983

Two-Photon Transitions in Positronium

A. Quattropani

*Institut de Physique Théorique, Ecole Polytechnique Fédérale de Lausanne, PHB-Ecublens,
CH-1015 Lausanne, Switzerland*

and

F. Bassani

Scuola Normale Superiore, I-56100 Pisa, Italy



Resonant two-photon absorption by exciton-polariton in evaporated CuCl films
John K. Pribram, G. L. Koos, F. Bassani, and J. P. Wolfe, Phys. Rev. B 28 (1983)

Exciton-polaritons and semiconductor heterostructures

IL NUOVO CIMENTO

VOL. 7 D, N. 1

Gennaio 1986

Quantum Theory of Polaritons with Spatial Dispersion: Exact Solutions.

A. QUATTROPANI

Institut de Physique Théorique, EPF-L - CH-1015 Lausanne, Switzerland

L. C. ANDREANI and F. BASSANI

Scuola Normale Superiore - I-56100 Pisa, Italia



Radiative lifetime of free excitons in quantum wells

Solid State Communications 77 (1991)

Lucio Claudio Andreani, Francesco Tassone, Franco Bassani

Hole subbands in strained GaAs-Ga_{1-x}Al_xAs quantum wells: Exact solution of the effective-mass equation

Phys. Rev. B 36 (1987)

Lucio Claudio Andreani, Alfredo Pasquarello, and Franco Bassani

Scuola Normale Superiore, 56100 Pisa, Italy



Photoluminescence of Highly Excited GaAs/AlGaAs Quantum Wells

Europhys. Lett. 7 (1988)

R. Cingolani, M. Ferrara, M. Lugarà, C. Moro, Y. Chen, F. Bassani, J. Massies and F. Turco

Electronic states and optical properties

Surface and size effects on the electronic states of small metallic clusters

J. Phys. C: Solid State Phys. 16 (1983)

G.B. Bachelet, F. Bassani, M. Bourg and A. Julg



Model calculation of the optical properties of metallic particles in a dielectric medium

Surface Sci. 156 (1985)

F. Cocchini, F. Bassani and M. Bourg

Polaronic effects on exciton-states with different angular momenta

Physica Status Solidi B 153 (1989)

G. Iadonisi, F. Bassani, G. Strinati

Inversion asymmetry and hole magneto-optics in zinc-blende semiconductors

Phys. Rev. B 37 (1988)

F. Bassani, G.C. La Rocca and S. Rodriguez



Computational quantum chemistry

J. Chem. Phys., Vol. 79, No. 3, 1 August 1983

A general method for approximating the electronic correlation energy in molecules and solids

Renato Colle and Oriano Salvetti

*Scuola Normale Superiore, 56100 Pisa, Italy
and Istituto di Chimica Quantistica ed Energetica Molecolare del C.N.R., Via Risorgimento 35, 56100
Pisa, Italy*

Auger emission from the LiF molecule: calculation of probabilities and energies

Phys. Rev. A 38 (1988)

R. Colle, **S. Simonucci**, T. Woodruff



Excited states and Jahn-Teller interactions

In the sodium trimer

J. Chem. Phys. 88 (1988)

F. Cocchini, T. Upton and **W. Andreoni**

Complex systems

**Kinetic-equation for strongly disordered systems:
non-interacting electrons**

Phys. Rev. B 40 (1989)

G. Strinati, C. Castellani, C. Di Castro

**Kinetic-equation for strongly disordered systems:
interacting electrons**

Phys. Rev. B 44 (1991)

G. Strinati, C. Castellani, C. Di Castro, G. Kotliar



PHYSICAL REVIEW B

VOLUME 44, NUMBER 14

1 OCTOBER 1991-II

Doping-induced incommensurate antiferromagnetism in a Mott-Hubbard insulator

E. Arrigoni and G. C. Strinati

Scuola Normale Superiore, I-56100 Pisa, Italy



1991-2000 faculty and research associates in **condensed matter theory** (and **cognate disciplines**)

- Fabio Beltram (since 1992)
experimental condensed matter
- Franco Strocchi (since 1994)
quantum field theory
- Sergio Caracciolo (since 1996)
statistical mechanics
- Paolo Giannozzi (since 1991)
condensed matter theory
- Giuseppe La Rocca (since 1991)
condensed matter theory
- Vittorio Pellegrini (since 1998)
experimental condensed matter

*plus tens of students, post-docs
and visiting scholars !*

Atomic dynamics in liquids (N.H. March and M.P. Tosi, 1976)

Ionic liquids and liquid metals

Atomic size effects on local coordination number and medium range order in molten trivalent metal chlorides

J. Phys. Cond. Mat. 4 (1992)

H. Tatlipinar, **Z. Akdeniz**, G. Pastore, M.P. Tosi



Vibrational and elastic properties of alkali halides near melting

Philosophical Magazine B 72 (1995)

V. Tozzini, M.P. Tosi

Generalized Stokes-Einstein relation for liquid metals near freezing

Phys. Rev. E 60 (1999)

N.H. March, M.P. Tosi



Electron gas

Static Response and Local Field Factor of the Electron Gas

Phys. Rev. Lett. 75 (1995)

Saverio Moroni,¹ David M. Ceperley,² and Gaetano Senatore³

¹FORUM-INFN, Institute for Condensed Matter Theory, Scuola Normale Superiore, I-56126 Pisa, Italy

²National Center for Supercomputing Applications, Department of Physics, University of Illinois, Urbana, Illinois 61801

³Dipartimento di Fisica Teorica, Università di Trieste, Strada Costiera 11, I-34014 Trieste, Italy

Plasmon dispersion and dynamic exchange-correlation Potentials from two-pair excitations in degenerate plasmas

J. Phys. Cond. Mat. 8 (1996)

H. Bohm, S. Conti, M.P. Tosi



Dynamic exchange-correlation potentials for the electron gas in dimensionality D=3 and D=2

Phys. Rev. B 58 (1998)

R. Nifosì, S. Conti, M.P. Tosi



The charge-charge local field factor and the exchange correlation kernel of a 2D electron gas

Phys. Rev. B 64 (2001)

B. Davoudi, M. Polini, G.F. Giuliani, M.P. Tosi



Ultracold atomic condensates



Linear density response in the random-phase approximation for confined Bose vapours at finite temperature

J. Phys. Cond. Mat. 9 (1997)

A. Minguzzi and M.P. Tosi

Output from Bose condensates in tunnel arrays

Phys. Lett. A 268 (2000)

M.L. Chiofalo and M.P. Tosi



Emergence of interaction effects in Bose-Einstein condensation

Phys. Rev. Lett. 78 (1997) M.J. Holland, D.S. Jin, M.L. Chiofalo and J. Cooper



Exact particle and kinetic-energy densities for one-dimensional confined gases of noninteracting fermions

Phys. Rev. Lett. 85 (2000)

P. Vignolo, A. Minguzzi and M.P. Tosi

Ultracold atomic condensates



Evolution from BCS superconductivity to Bose condensation

Phys. Rev. B 53 (1996)

F. Pistolesi and G.C. Strinati

Dynamic splitting of a Bose-Einstein condensate

Phys. Rev. A 63 (2001)

C. Menotti, J.R. Anglin, J.I. Cirac, P. Zoller



Modulated Optical Lattice as an Atomic Fabry-Perot Interferometer

Phys. Rev. Lett. 84 (2000)

I. Carusotto and G. C. La Rocca

“big” events...

7th General Conference of the Condensed Matter Division
of the European Physical Society

co-chaired by: F. Bassani, G. Grosso, G. Pastori Parravicini and M.P. Tosi

held in Pisa from 7 to 10 April 1987, it was attended by about 900 participants,
coming from more than 30 countries of Europe and overseas

...and “small” ones

Forum-INFN Workshop on
Computer simulations of systems of biological interest

Scuola Normale Superiore of Pisa, May 12-14, 1997.
organized by: F. Buda and P. Giannozzi

a seminal meeting calling the attention of computational physicists on
the modelling of biological relevant matter

Electronic band structure, optical and vibrational properties

In-plane Raman scattering of Si/Ge superlattices

Phys. Rev. B 49 (1994)

R. Schorer, G. Astreiter, S. de Gironcoli, E. Molinari,
H. Kibbel, H. Presting



Empirical spds* tight-binding calculation for cubic semiconductors

Phys. Rev. B 57 (1998)

J.M. Jancu, R. Scholz, F. Beltram, F. Bassani

Charge localization and dynamics in rhodopsin

Phys. Rev. Lett. 77 (1996)

F. Buda, H. deGroot, A. Bifone



A tight-binding model for the optical properties of Au₅₅ clusters

Zeitsch. Phys. D 29 (1994)

A. Bifone, F. Bassani

Electronic band structure, optical and vibrational properties

Vibrational and dielectric properties of C_{60} from density-functional perturbation theory

Paolo Giannozzi

Scuola Normale Superiore and Forum di Fisica Teorica dell'INFN, Piazza dei Cavalieri 7, I-56126 Pisa, Italy

Stefano Baroni

Scuola Internazionale Superiore di Studi Avanzati (SISSA) Via Beirut 2/4, I-34014 Trieste, Italy^{a)} and Institut Romand de Recherche Numérique en Physique des Matériaux (IRRMA), Lausanne, Switzerland

J. Chem. Phys. 100 (1994)



Towards very large scale electronic structure calculations

Europhys. Lett. 17 (1992) S. Baroni, P. Giannozzi



Subpicosecond vibronic dynamics in KBr F centers

Phys. Rev. B 56 (1997)

R. Scholz, M. Schreiber, F. Bassani, M. Nisoli, S. De Silvestri, O. Svelto

Near-infrared transitions in iron-based diluted magnetic semiconductors

Phys. Rev. B 49 (1994)

V. Savona, F. Bassani, S. Rodriguez



Semiconductor heterostructures

2nd-order non-linear optical susceptibility of asymmetric quantum wells

Phys. Rev. B 50 (1994)

R. Atanasov, F. Bassani, V.M. Agranovich



Förster energy transfer from a semiconductor quantum well to an organic material overlayer

Europ. Phys. J. B 8 (1999)

D. Basko, G.C. La Rocca, F. Bassani, V.M. Agranovich

Spin-orbit splitting of electronic states in Semiconductor asymmetric quantum wells

Phys. Rev. B 55 (1997)

E. De Andrada e Silva, G.C. La Rocca, F. Bassani



Polaritons in anisotropic semiconductors

Z. Phys. B 98 (1995)

F. Bassani, G. Czajkowski, A. Tredicucci

Nonlinear optics

Dispersion relations and sum rules in nonlinear optics

F. Bassani and S. Scandolo

Scuola Normale Superiore, 56100 Pisa, Italy

Phys. Rev. B 44 (1991)



Asymptotic behaviour and general properties of harmonic generation susceptibilities

Europ. Phys. J. B 17 (2000) F. Bassani, V. Lucarini

