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Biography

Born in Civitanova Marche (MC) Italy in 1957. He received his Diploma di Laurea in Physics in 1982 from University of Pisa, Italy (tutor Prof. Erseo Polacco) defending the experimental thesis: "Resonance Raman scattering from $\text{CrO}_4^{=}$ ion". During 1983-1987 he was a Ph.D. student in Physics, University of Milan, Italy (tutor: Prof. Marzio Giglio) and defended the experimental thesis: "Light scattering from fractal clusters". In 1989-1991 worked as a Postdoctoral fellow in the Physics Department, University of California, USA collaborating with Prof. David S. Cannell and carrying out experiments on "structure of silica gels and demixing of a binary mixture in silica gels". In 1993 he won a permanent position as Researcher in Physics with the Department of Physics and Mathematics University of Insubria at Como, Italy. Since then, he has been working in the field of coherent optics and condensed matter, carrying out optical experiments on complex fluids, colloidal aggregation, polymeric gels, and developing new techniques for static and dynamic light scattering, and for particle sizing.

Qualifications and awards

Responsible of the "Light Scattering Laboratory" at the Department of Physics and Mathematics in Como, Italy.

Research interests

Research activity is fully illustrated in the web-page of the Light Scattering Laboratory: http://scienze-como.uninsubria.it/ferri/lab/light_scattering_laboratory.html

A summary of the current research activities:

Fibrin gels: structure and kinetics: Fibrin gels are biological networks of fundamental importance in blood coagulation and in other biomedical applications. They are grown from the polymerization of the macromolecule fibrinogen, after activation by the enzyme thrombin. We study the growth kinetics and the structure of fibrin gels by low-angle elastic light scattering, turbidimetry, and confocal microscopy, measuring their mesh-size, fractal dimension and fiber diameter.

Software correlators: We have developed various software correlators suitable for photon and fluorescence correlation spectroscopy. The correlators work by using standard acquisition hardware + home-made LabView software. Software correlators are cheap, flexible, and almost as fast as hardware correlators! The programs are protected by copyright and are in the process of being commercialized.

Ghost imaging: Ghost imaging is a technique which allows to do

coherent imaging with incoherent light. By cross-correlating the stochastic far-field spatial distribution of two twin speckle beams (one of which passes through the object), it is possible to recover the object diffraction pattern, the same that one would observe with coherent illumination. We carry our ghost imaging experiments on amplitude and phase objects, showing that this technique is intrinsically much more powerful than the classical Hanbury-Brown-Twiss method.

Heterodyne Near Field Scattering Techniques: Heterodyne Near Field Scattering (HNFS) is a novel technique for studying the static and dynamic properties of systems whose dimensions are comparable with the wavelength of light. HNFS is an extremely valid alternative to traditional low-angle light scattering and, therefore, suitable for characterizing complex fluids. We use HNFS for studying colloidal aggregation and performing particle sizing and velocimetry. In the latter case the technique is called Heterodyne Speckle Velocimetry (HSV) because it is based on the velocity of the heterodyne speckles generated by small tracking particles moving with the fluid. HSV provides 2D velocity mappings in the direction orthogonal to the optical axis and velocity distributions over the entire sample thickness.

Droplet vaporization: We use low-angle elastic light scattering to study the vaporization rate of liquid droplets in a high-pressure environment. This topic is important for combustion science and technology because it affects significantly the efficiency of high-pressure combustion devices, such as liquid-propellant rockets, gas turbines and diesel engines.

Teaching experience and appointments

Present-2002: responsible of the course "Laboratorio 5" of the 3rd year in Physics (Laurea triennale).

Present-2002: responsible of the course "Physics" of the 1st year in Scienze dei Beni e delle Attività Culturali (Laurea triennale).

Tutor of nearly 10 undergraduate students in Physics who defended their experimental thesis carried out at the "Light Scattering Laboratory" in Como.

Lecturer of national and international Doctorate Schools at University of Milan - Italy, University of Stuttgart - Germany, University of Lausanne – Switzerland.

Representative publications

M. Alaimo, D. Magatti, F. Ferri, and M.A.C. Potenza

Heterodyne speckle velocimetry

Appl. Phys. Lett., **88**, (2006) 191101-1/3.

M. Bache, D. Magatti, F. Ferri, A. Gatti, E. Brambilla, and L.A. Lugiato

Coherent imaging of a pure phase object with classical incoherent light

Phys. Rev. A, **73**, (2006) 53802-1/12.

A. Gatti, M. Bache, D. Magatti, E. Brambilla, F. Ferri, and L.A. Lugiato

Coherent imaging with pseudo-thermal incoherent light

J. Modern Optics, **53**, (2006) 739-760

M.A.C. Potenza, M. Alaimo, D. Pescini, D. Magatti, F. Ferri, and M. Giglio

A new technique for fluid velocimetry based on near field scattering

Optics and Lasers in Engineering, **44**, (2006) 722-731

M.A.C. Potenza, D. Pescini, D. Magatti, F. Ferri, and M. Giglio
A new particle sizing technique based on near field scattering
Nucler Physics B, **150**, (2006) 334-338.

F. Ferri, D. Magatti, A. Gatti, M. Bache, E. Brambilla, and L.A. Lugiato
High-resolution ghost image and ghost diffraction experiments with thermal light
Phys. Rev. Lett., **94**, (2005) 180632-1/4.

G. Lamanna, H. Sun, B. Weigand, D. Magatti, P. Micciche, and F. Ferri
Measurements of droplet vaporization by means of means of light scattering
Colloidal Surfaces A, **261**, (2005) 153-161.

F. Ferri, D. Magatti, D. Pescini, M.A.C. Potenza, and M. Giglio
Heterodyne near field scattering: a technique for complex fluids
Phys. Rev. E., **70**, (2004) 41405-1/9.

A. Profumo, M. Turci, G. Damonte, F. Ferri, D. Magatti, B. Cardinali, C. Cuniberti, and M. Rocco
Kinetics of fibrinopeptide release by thrombin as a function of CaCl₂ concentration: different susceptability of FPA and FPB and evidence for a fibrinogen isoform specific effect at physiological Ca²⁺ concentration
Biochemistry, **42**, (2003) 12335 12348.

F. Ferri and D. Magatti
Hardware simulator for photon correlation spectroscopy
Rev. Sci. Instrum., **74**, (2003) 4273 4279.

M. De Spirito, G. Arcovito, M. Papi, M. Rocco, and F. Ferri
Small and wide angle elastic light scattering study of fibrin structure
J. Appl. Cryst., **36**, (2003) 636 641.

D. Magatti and F. Ferri
25 ns software correlator for photon correlation spectroscopy
Rev. Sci Instrum., **74**, (2003) 1135 1144.

F.Ferri, M.Greco, G.Arcovito, M.De Spirito, and M.Rocco
Structure of fibrin gels studied by elastic light scattering techniques: Dependence of fractal dimension, gel crossover length, fiber diameter, and fiber density on monomer concentration
Phys. Rev. E., **66**, (2002) 11913/1 13.

E.Paganini, F.Trespidi, and F.Ferri
Instrument for long path spectral extinction measurements in air: application to sizing of airborne particles
Applied Optics, **40**, (2001) 4261 4274.

D.Magatti and F.Ferri
Fast multi tau real time software correlator for dynamic light scattering
Applied Optics, **40**, (2001) 4011 4021.

F.Ferri, M.Greco, G.Arcovito, F.Andreasi Bassi, M.De Spirito, E.Paganini, and M.Rocco
Growth kinetics and structure of fibrin gels

Phys. Rev. E, **63**, (2001) 31401/1 17.

M.De Spirito, G.Arcovito, F.Andreasi Bassi, and F.Ferri
On the dynamics of semiflexible fibrin gels
Macromol. Symp., **162**, (2000) 263-274.

S.Bernocco, F.Ferri, A.Profumo, C.Cuniberti, and M.Rocco
Polymerization of rod like macromolecular monomers studied by stopped flow, multiangle light scattering: set up, data processing, and application to fibrin formation
Biophys. J., **79**, (2000) 561 583.

A.Bassini, S.Musazzi, E.Paganini, U.Perini, and F.Ferri
Self aligning optical particle sizer for the monitoring of particles growth processes in industrial plants
Rev. Sci. Instrum., **69**, (1998) 2484 2494.

F.Ferri, G.Righini, and E.Paganini
Inversion of low angle elastic light scattering data with a new method devised by modifying the Chahine algorithm
Applied Optics, **36**, (1997) 7539 7550.

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Use of charge coupled device camera for low angle elastic light scattering
Rev. Sci Instrum., **68**, (1997) 2265 2274.

F.Ferri, A.Bassini and E.Paganini
Commercial spectrophotometer for particle sizing
Applied Optics, **36**, (1997) 885 891.

B.J.Frisken, F.Ferri, and D.S.Cannell
Studies of critical behavior in the presence of a disordered environment
Phys. Rev. E, **51**, (1995) 5922 5943.

F.Ferri, A.Bassini and E.Paganini
Modified version of the Chahine algorithm to invert spectral extinction data for particle sizing
Applied Optics, **34**, (1995) 5829 5839.

D.S.Cannell, F.Ferri and B.J.Frisken
Reply on a Comment on Structure of silica gels
Phys. Rev. Lett., **71**, (1993) 1475.

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Structure of silica gels
Phys. Rev. Lett., **67**, (1991) 3626 3629.

B.J.Frisken, F.Ferri and D.S.Cannell
Effect of dilute silica gel on phase separation of a binary mixture
Phys. Rev. Lett., **66**, (1991) 2754 2757.

M.Carpineti, F.Ferri, M.Giglio, E.Paganini and U.Perini
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Phys. Rev. A, **42**, (1990) 7347 7354.

F.Ferri, M.Giglio and U.Perini

Inversion of light scattering data from fractals by means of the Chahine iterative algorithm

Appl. Optics, **28**, (1989) 3074-3082.

F.Ferri, M.Giglio, E.Paganini and U.Perini

Low angle elastic light scattering study of diffusion limited aggregation

Europhys. Lett., **7**, (1988) 599-604.