

## Research Articles

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### Research Articles

submitted      accepted      published  
'99 '00 '01 '02 '03 '04 '05 '06 '07 '08 '09 '10 '11 '12 '13 '14 '15 '16 '17 '18 '19 '20

#### 2020

Ultrafast dynamics and vibrational relaxation in six-coordinate heme proteins revealed by Femtosecond Stimulated Raman Spectroscopy.

C. Ferrante, G. Batignani, E. Pontecorvo, L.C. Montemiglio, M. H. Vos and T. Scopigno.

Journal of the American Chemical Society, 142, 2285, (2020) (pdf).

Two-dimensional impulsively stimulated resonant Raman spectroscopy of molecular excited-states.

G. Fumero, C. Schnedermann, G. Batignani, T. Wende, M. Liebel, G. Bassolino, C. Ferrante, S. Mukamel, P. Kukura, T. Scopigno.

Physical Review X, XX, xxx, (2020).

#### 2019

Broadband Impulsive Stimulated Raman Scattering based on a Chirped Detection.

G. Batignani, C. Ferrante, G. Fumero and T. Scopigno.

The Journal of Physical Chemistry Letters, 10, 7789, (2019) (pdf).

Modeling the ultrafast response of two-magnon Raman excitations in antiferromagnets on the femtosecond timescale.

G. Batignani, E. Pontecorvo, D. Bossini, C. Ferrante, G. Fumero, G. Cerullo, S. Mukamel and T. Scopigno.

Annalen der Physik, 1900439, (2019) (pdf).

Coherent anti-Stokes Raman Spectroscopy of single and multi-layer graphene.

A. Virga, C. Ferrante, G. Batignani, D. De Fazio, A. D. Nunn, A. C. Ferrari, G. Cerullo, T. Scopigno.

Nature Communications, 10, 3658, (2019) (pdf).

Genuine dynamics vs cross phase modulation artefacts in Femtosecond Stimulated Raman Spectroscopy.

G. Batignani, G. Fumero, E. Pontecorvo, C. Ferrante, S. Mukamel, T. Scopigno.

ACS Photonics, 6, 492, (2019) (pdf).

Tracking the connection between disorder and energy landscape in glasses using geologically hyperaged amber.

E. A. A. Pogna, A. I. Chumakov, C. Ferrante, M. A. Ramos, T. Scopigno.

The Journal of Physical Chemistry Letters, 10, 427, (2019) (pdf).

The Potential of EuPRAXIA@SPARC\_LAB for Radiation Based Techniques.

A. Balerna, S. Bartocci, G. Batignani et al.

Condensed Matter, 4, 30, (2019) (pdf).

2018 Probing Femtosecond Lattice Displacement upon Photo-carrier generation in Lead Halide Perovskite.

Giovanni Batignani, Giuseppe Fumero, Ajay Ram Srimath Kandada, Giulio Cerullo, Marina Gandini, Carino Ferrante, Annamaria Petrozza, Tullio Scopigno.

Nature Communications, 9, 1971, (2018) DOI: 10.1038/s41467-018-04367-6 arxiv (pdf).

Comment on: "Emergence and evolution of the k gap in spectra of liquid and supercritical states".

T. Bryk, I. Mryglod, G. Ruocco, and T. Scopigno.  
Physical Review Letters, 120, 219601, (2018) (pdf).

Reply to Comment on: "Behaviour of Supercritical Fluids Across the "Frenkel Line".

T. Bryk, F. Gorelli, I. Mryglod, G. Ruocco, M. Santoro and T. Scopigno.  
The Journal of Physical Chemistry B, XX, xxxx, (2018) DOI: 10.1021/acs.jpcc.8b01900 (pdf).

Raman spectroscopy of graphene under ultrafast laser excitation.

C. Ferrante, A. Virga, L. Benfatto, M. Martinati, D. De Fazio, U. Sassi, C. Fasolato, A. K. Ott, P. Postorino, D. Yoon, G. Cerullo, F. Mauri, A. C. Ferrari, T. Scopigno.  
Nature Communications, 9, 308, (2018) arXiv (pdf).

Resonant Broadband Stimulated Raman scattering in Myoglobin.

C. Ferrante, G. Batignani, G. Fumero, E. Pontecorvo, A. Virga, L. C. Montemiglio, G. Cerullo, M. H. Vos, T. Scopigno.  
Journal of Raman Spectroscopy, 1-8 (2018) DOI: 10.1002/jrs.5323 (pdf).

## 2017

Behaviour of Supercritical Fluids Across the "Frenkel Line".

T. Bryk, F. Gorelli, I. Mryglod, G. Ruocco, M. Santoro and T. Scopigno.  
The Journal of Physical Chemistry Letters, 8, 4995, (2017) (pdf).

Manipulating impulsive stimulated Raman spectroscopy with a chirped probe pulse.

L. Monacelli, G. Batignani, G. Fumero, C. Ferrante, S. Mukamel and T. Scopigno.  
The Journal of Physical Chemistry Letters, 8, 966, (2017) (pdf).

In-line balanced detection stimulated Raman scattering microscopy.

Francesco Crisafi, Vikas Kumar, Tullio Scopigno, Marco Marangoni, Giulio Cerullo and Dario Polli.  
Scientific Reports, 7, 10745, (2017) (pdf).

## 2016

Direct observation of subpicosecond vibrational dynamics in photoexcited myoglobin.

C. Ferrante, E. Pontecorvo, G. Cerullo, M.H. Vos and T. Scopigno.  
Nature Chemistry, 8, 1137-1143 (2016) DOI: 10.1038/NCHEM.2569 (pdf).

Visualizing excited-state dynamics of a diaryl thiophene: femtosecond stimulated Raman scattering as a probe of conjugated molecules.

G. Batignani, E. Pontecorvo, C. Ferrante, M. Aschi, C.G. Elles and T. Scopigno.  
The Journal of Physical Chemistry Letters, 7, 2981, (2016) (pdf).

The histone deacetylase inhibiting drug Entinostat induces lipid accumulation in differentiated HepaRG cells.

Abigail Nunn, Tullio Scopigno, Natalia Pediconi, Massimo Levrero, Henning Hagman, Juris Kiskis, and Annika Enejder.  
Scientific Reports, 6, 28025, (2016) doi: 10.1038/srep28025 (pdf).

Broadband Stimulated Raman spectroscopy in electronically resonant biomolecules.

G. Batignani, E. Pontecorvo, G. Giovannetti, C. Ferrante, G. Fumero and T. Scopigno.  
Scientific Reports, 6, 18445, (2016) doi: 10.1038/srep18445 (pdf).

Probing ultrafast processes by fifth order Stimulated Raman Scattering.

G. Fumero, G. Batignani, K. E. Dorfman, S. Mukamel and T. Scopigno.  
Journal of Physics: Conference Series, 689, 012023, (2016) (pdf).

Probing ultrafast photo-induced dynamics of the exchange energy in a Heisenberg antiferromagnet.

G. Batignani, D. Bossini, N. Di Palo, C. Ferrante, E. Pontecorvo, G. Cerullo, A. Kimel and T. Scopigno, OSA Technical Digest, <http://dx.doi.org/10.1364/UP-2016-UTH3A.7> (2016) (pdf).

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On the resolution limit of Femtosecond Stimulated Raman Spectroscopy: modelling fifth-order signals with overlapping pulses.

G. Fumero, G. Batignani, K. E. Dorfman, S. Mukamel and T. Scopigno.  
Chem. Phys. Chem., 16, 3438-3443, (2015) (pdf) (cover of the magazine )

Probing ultrafast photoinduced dynamics of the exchange energy in an Heisenberg antiferromagnet.  
G. Batignani, D. Bossini, N. Di Palo, C. Ferrante, E. Pontecorvo, G. Cerullo, A. Kimel and T. Scopigno.  
Nature Photonics, 9, 506, (2015) (pdf).

Pressure-induced emergence of unusually high-frequency transverse excitations in a liquid alkali metal: Evidence of two types of collective excitations contributing to the transverse dynamics at high pressures.

T. Bryk, G. Ruocco, T. Scopigno and A. Seitsonen.  
Journal of Chemical Physics, 143, 104502 (2015) (pdf).

Probing equilibrium glass flow up to exapoise viscosities.

E.A.A. Pogna, C. Rodriguez-Tinoco, G. Cerullo, C. Ferrante, J. Rodriguez-Viejo and T. Scopigno.  
Proceedings of the National Academy of Science, 112, 2331-2335 (2015) (pdf).

Metformin targets a phosphoSTAT3-miRNAs pathway to inhibit lipid droplets accumulation and intracellular inflammation in vitro and in vivo.

N. Pediconi, S. Di Cocco, S. Piconese, F. Mori, L. Belloni, A. D. Nunn, T. Scopigno, V. Barnaba, G. Blandino, S. Strano, M. Levrero.  
Hepatology, 62, 680 (2015).

Energy flow between spectral components in 2D Broadband Stimulated Raman Spectroscopy.

G. Batignani, G. Fumero, S. Mukamel and T. Scopigno.  
Physical Chemistry Chemical Physics, 17, 10454 (2015) DOI: 10.1039/c4cp05361c (pdf).

Heat capacity of liquids: A hydrodynamic approach.

T. Bryk, T. Scopigno and G. Ruocco.  
Condensed Matter Physics, 18, 13606 (2105). (pdf).

Collective Excitations in Supercritical Fluids.

T. Bryk, F. Gorelli, G. Ruocco, M. Santoro and T. Scopigno.  
Physics of Liquid Matter: Modern Problems, Springer Proceedings in Physics, vol. 171, chap. 4 (2105). (pdf).

Theory of vibrational anomalies in glasses.

Walter Schirmacher, Tullio Scopigno and Giancarlo Ruocco.  
Journal of Non-Crystalline Solids, 407, 133-140 (2105). <http://dx.doi.org/10.1016/j.jnoncrysol.2014.09.054> (pdf).

Low-noise, vibrational-phase-sensitive chemical imaging by balanced detection RIKE.

Vikas Kumar, Nicola Coluccelli, Marco Cassinerio, Michele Celebrano, Abigail Nunn, Massimo Levrero, Tullio Scopigno, Giulio Cerullo and Marco Marangoni.  
Journal of Raman Spectroscopy, 46, 109-116, (2015) DOI 10.1002/jrs.4584 (pdf).

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Collective excitations in soft-sphere fluids.

T. Bryk, F. Gorelli, M. Santoro, G. Ruocco and T. Scopigno.  
Physical Review E, 90, 042301 (2014) (pdf).

Snapshots of sub-ps dynamics in heme-proteins captured by Femtosecond Stimulated Raman Scattering.

Tullio Scopigno, Carino Ferrante, Emanuele Potecorvo, Giovanni Batignani, OSA Technical Digest,  
<http://dx.doi.org/10.1364/UP.2014.11.Fri.A.6> (2014) (pdf).

Charge-density correlations in pressurized liquid lithium calculated using ab initio molecular dynamics.

Taras Bryk, Ivan Klevets, Giancarlo Ruocco, Tullio Scopigno, Ari P. Seitsonen.  
Physical Review B, 90, 014202 (2014) (pdf).

Acoustic dynamics of supercooled indomethacin probed by Brillouin light scattering.  
S. De Panfilis, E.A.A. Pogna, A. Virga and T. Scopigno.  
Physical Chemistry Chemical Physics, 16, 14206 (2014) (pdf).

Structural rearrangement accompanying the ultrafast electrocyclization of a photochromic molecular switch.  
E. Pontecorvo, C. Ferrante, C.G. Elles and T. Scopigno.  
Journal of Physical Chemistry B, 118, 6915-6921, (2014) (pdf).

Interplay between Fragility and Glass Dynamics.

T. Scopigno and D. Cangialosi.

Fragility of Glass-forming Liquids, 16, Text and readings in the physical sciences, Hindustan Book Agency (2014). IRIDE: Interdisciplinary research infrastructure based on dual electron linacs and lasers

M. Ferrario et al.

Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, 740, 138-146 (2014).

## 2013

Acoustic-like dynamics of amorphous drugs in the THz regime.

E.A.A. Pogna, C. Rodriguez-Tinoco, M. Krisch, J. Rodriguez-Viejo and T. Scopigno.

Scientific Reports, 3, 2518; doi:10.1038/srep02518 (2013). (pdf)

Dynamical crossover at the liquid-liquid transformation of a compressed molten alkali metal.

T. Bryk, S. De Panfilis, F.A. Gorelli, E. Gregoryanz, M. Krisch, G. Ruocco M. Santoro, T. Scopigno and A.P. Seitsonen.

Physical Review Letters, 111, 077801, (2013). (pdf)

Acoustic dynamics of network-forming glasses at mesoscopic wavelengths.

C. Ferrante, E. Pontecorvo, G. Cerullo, A. Chiasera, G. Ruocco, W. Schirmacher and T. Scopigno.

Nature Communications, 4:1793 doi: 10.1038/ncomms2826 (2013). (pdf)

Spectrally tailored narrowband pulses for femtosecond stimulated Raman spectroscopy in the range 330nm-750nm.

E. Pontecorvo, C. Ferrante, C.G. Elles and T. Scopigno.

Optics Express, 21, 6866-6872 (2013). (pdf)

Landau-Placzek ratio for heat density dynamics and its application to heat capacity of liquids.

T. Bryk, G. Ruocco and T. Scopigno.

Journal of Chemical Physics, 138, 034502 (2013). (pdf)

Dynamics and Thermodynamics beyond the critical point .

F.A. Gorelli, T. Bryk, M. Krisch, G. Ruocco M. Santoro and T. Scopigno.

Scientific Reports, 3, 1203, DOI:10.1038/srep01203. (pdf)

## 2012

Visualizing Coherent Phonon Propagation in the 100 GHz Range: a Broadband Picosecond Acoustics Approach.

C. Ferrante, E. Pontecorvo, D. Polli, G. Cerullo and T. Scopigno.

Lasers and Electro-Optics (CLEO) and Quantum Electronics and Laser Science Conference (QELS), 2012

Conference on, p.p. 1-2,

6-11 May 2012. (pdf)

## 2011

Computer simulation study of thermodynamic scaling of dynamics of  $2\text{Ca}(\text{NO}_3)_2 \cdot 3\text{KNO}_3$ .

M. Ribeiro, T. Scopigno and G. Ruocco.

Journal of Chemical Physics, 135, 164510 (2011). (pdf)

Pressure behavior of the sound velocity of liquid water at room temperature in the terahertz regime.

M. Santoro, F. Gorelli, T. Scopigno, M. Krisch, F. Sette and G. Ruocco.  
Physical Review B, 84, 092301 (2011). (pdf)

Response to "Comment on "Visualizing coherent phonon propagation in the 100 GHz range: A broadband picosecond acoustics approach".

E. Pontecorvo, C. Ferrante, M. Ferretti, M. Ortolani, D. Polli, G. Ruocco, G. Cerullo and T. Scopigno.  
Applied Physics Letters, 98, 246102 (2011). (pdf) (Comment )

Vibrational dynamics and surface structure of amorphous Se.

T. Scopigno, W. Steurer, S. N. Yannopoulos, A. Chrissanthopoulos, M. Krisch, G. Ruocco and T. Wagner.  
Nature Communications, 2:195 (2011) doi 10.1038/ncomms1197. (pdf)

Femtosecond Stimulated Raman Spectrometer in the 320-520nm range.

E. Pontecorvo, S.M. Kapetanaki, M. Badioli, D. Brida, M. Marangoni, G. Cerullo and T. Scopigno.  
Optics Express, 19, 1107 (2011). (pdf)

Visualizing coherent phonon propagation in the 100 GHz range: A broadband picosecond acoustics approach.

E. Pontecorvo, M. Ortolani, D. Polli, M. Ferretti, G. Ruocco, G. Cerullo and T. Scopigno.  
Applied Physics Letters, 98, 011901 (2011). (pdf) (cover of the magazine)

## 2010

Broadly tunable narrowband pump pulses for Femtosecond Stimulated Raman Spectroscopy.

M. Badioli, D. Brida, S.M. Kapetanaki, M. Marangoni, E. Pontecorvo, A. Quatela, G. Cerullo and T. Scopigno.  
Lasers and Electro-Optics (CLEO) and Quantum Electronics and Laser Science Conference (QELS), 2010 Conference on, p.p. 1-2,  
16-21 May 2010. (pdf)

The Widom's line as the crossover between liquid-like and gas-like behaviour in supercritical fluids.

G.G. Simeoni, T. Bryk, F.A. Gorelli, M. Krisch, G. Ruocco, M. Santoro and T. Scopigno.  
Nature Physics, 6, 503-507 (2010). (pdf)

Sound attenuation and anharmonic damping in solids with correlated disorder.

W. Schirmacher, C. Tomaras, B. Schmid, G. Baldi, G. Vilianni, G. Ruocco and T. Scopigno.  
Condensed Matter Physics, 13, 23606 (2010) (pdf)

Collective excitations in supercritical fluids: Analytical and molecular dynamics study of "positive" and "negative" dispersion.

Taras Bryk, Ihor Mryglod, Tullio Scopigno, Giancarlo Ruocco, Federico Gorelli, Mario Santoro.  
The Journal of Chemical Physics, 132, 1 (2010) (pdf)

Universal relation between viscous flow and fast dynamics in glass-forming materials.

T. Scopigno, D. Cangialosi and G. Ruocco.  
Physical Review B, 81, 100202 (2010) (pdf)

## 2009

Slow dynamics of liquid Se studied by InfraRed Photon Correlation Spectroscopy.

S. Cazzato, T. Scopigno, S. N. Yannopoulos and G. Ruocco.  
Journal of Non-Crystalline Solids, 355, 1797-1800 (2009) (pdf)

Evaluating the Prigogine-Defay ratio for a glass former by molecular dynamics simulations.

M. C. C. Ribeiro, T. Scopigno and G. Ruocco.  
The Journal of Physical Chemistry B, 113, 3099, (2009) (pdf)

Inelastic X-ray Scattering from High Pressure Fluids in a Diamond Anvil Cell.

F. Gorelli, M. Santoro, T. Scopigno, M. Krisch, T. Bryk, G. Ruocco and R. Ballerini.  
Applied Physics Letters, 94, 074102, (2009) (pdf)

## 2008

Fragility and glassy dynamics of  $2\text{Ca}(\text{NO}_3)_2\cdot 3\text{KNO}_3$  under pressure: Molecular dynamics simulations.  
M.C. Ribeiro, T. Scopigno and G. Ruocco.  
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S. Cazzato, T. Scopigno, S. Hosokawa, M. Inui, W-C. Pilgrim and G. Ruocco.  
Journal of Chemical Physics 108, 234502 (2008) (pdf)

Collective Dynamics in Liquids: Today and Tomorrow.  
T. Scopigno and T. Bryk Editors  
(Special issue of) Condensed Matter Physics 11, No. 1 (2008). (pdf)

Crossover between Hydrodynamic and Kinetic Modes in Binary Liquid Alloys.  
S. Cazzato, T. Scopigno, T. Bryk, I. Mryglod and G. Ruocco.  
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Vibrational excitations in systems with correlated disorder.  
W. Schirmacher, B. Schmid, C. Tomaras, G. Viliani, G. Baldi, G. Ruocco and T. Scopigno.  
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## 2007

High frequency collective dynamics in liquid potassium.  
A. Monaco, T. Scopigno, P. Benassi, A. Giugni, G. Monaco, M. Nardone, G. Ruocco, and M. Sampoli.  
Journal of Non-Crystalline Solids 353, 3154 (2007). (pdf)

Relaxation dynamics and acoustic properties in simple liquids.  
T. Scopigno, and G. Ruocco.  
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Origin of the  $\lambda$ -Transition in Liquid Sulphur.  
T. Scopigno, S. N. Yannopoulos, F. Scarponi, K. S. Andrikopoulos, D. Fioretto and G. Ruocco  
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Acoustic attenuation in glasses and its relation with the Boson Peak.  
W. Schirmacher, G. Ruocco and T. Scopigno.  
Physical Review Letters 98, 025501 (2007). (pdf)  
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Comment on "Glass-Specific Behavior in the Damping of Acousticlike Vibrations" by B. Ruffle' et al.  
G. Ruocco, A. Matic, T. Scopigno, S. Yannopoulos.  
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see also the Reply and the commented Letter

Reply to the Comment on "High frequency dynamics in metallic glasses" by E. Courtens et al .  
T. Scopigno, R. Angelini, G. Ruocco, J.-B. Suck.  
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see also the Comment and the commented Letter

## 2006

Liquid-like behavior of supercritical fluids.  
F. Gorelli, M. Santoro, T. Scopigno, M. Krisch and G. Ruocco.  
Physical Review Letters 97, 245702 (2006). (pdf)  
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High frequency dynamics in metallic glasses.  
T. Scopigno, L.-B. Suck, R. Angelini, F. Albergamo, and G. Ruocco.  
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High frequency dynamics of an orientationally disordered molecular crystal.

R. Angelini, T. Scopigno, A. Beraud and G. Ruocco.  
Journal of Non-Crystalline Solids 352, 4552 (2006). (pdf)

2005

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T. Scopigno, R. Di Leonardo, L. Comez, A.Q.R. Baron, D. Fioretto, G. Ruocco, and W. Montfrooij.  
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T. Scopigno, G. Ruocco, and F. Sette.  
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La transizione Vetrosa.

T. Scopigno.  
KOS - Periodico dell' Istituto Scientifico Universitario San Raffaele 232-233 (Gennaio-Febbraio 2005) (link to the Journal) (full pdf)

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T. Scopigno and G. Ruocco  
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Spectroscopic cell for fast pressure jumps across the glass transition line.

R. Di Leonardo, T. Scopigno, G. Ruocco, and U. Buontempo.  
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G. Ruocco, F. Sciortino, F. Zamponi, C. De Michele, and T. Scopigno.  
Journal of Chemical Physics 120, 10666 (2004). (pdf)  
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Collective dynamics in molten potassium: an inelastic x-ray scattering study.

A. Monaco, T. Scopigno, P. Benassi, A. Giugni, G. Monaco, M. Nardone, G. Ruocco, and M. Sampoli.  
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Evidence of anomalous dispersion of the generalized sound velocity in glasses.

B. Ruzicka, T. Scopigno, S. Caponi, A. Fontana, O. Pilla, P. Giura, G. Monaco, E. Pontecorvo, G. Ruocco, and F. Sette.  
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Physical Review Letters 92, 025503 (2004). (pdf)  
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Comment on "Collective dynamics in liquid lithium, sodium and aluminum" by S. Singh and K.

Tankeshwar.

T. Scopigno, and G. Ruocco.  
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High frequency transverse-like excitations in glassy glycerol.

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Philosophical Magazine 84, 1453 (2004). (pdf)  
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Inelastic x-ray scattering and the high frequency dynamics of molecular liquids.

E. Pontecorvo, R. Di Leonardo, C. Masciovecchio, G. Ruocco, B. Ruzicka, T. Scopigno, and F. Sette.  
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High frequency transverse dynamics in glasses.

T. Scopigno, E. Pontecorvo, R. Di Leonardo, M. Krisch, G. Monaco, G. Ruocco, B. Ruzicka, and F. Sette.  
Journal of Physics: Condensed Matter 15, S1269 (2003). (pdf)

High frequency acoustic modes in vitreous Beryllium Fluoride probed by inelastic x-ray scattering.

T. Scopigno, S.N. Yannopoulos, D.Th. Kastrissios, G. Monaco, E. Pontecorvo, G. Ruocco, and F. Sette.  
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New evidence for the idea of time-scale invariance of relaxation processes in simple liquids: the case of molten sodium.

R. M. Yulmetyev, A. V. Mokshin, T. Scopigno, P. Hanggi.  
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T. Scopigno, G. Ruocco, F. Sette, and G. Monaco.  
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High frequency dynamics in glassy selenium.

T. Scopigno, R. Di Leonardo and A.Q.R. Baron.  
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T. Scopigno, A. Filipponi, M. Krisch, G. Monaco, G. Ruocco, and F. Sette.  
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Evidence of short time dynamical correlations in simple liquids.



T. Scopigno, F. Sette, G. Ruocco, and G. Viliani.  
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Observation of Umklapp processes in non crystalline materials.  
T. Scopigno, M. D'Astuto, M. Krisch, F. Sette, and G. Ruocco.  
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Collective dynamics of liquid Aluminum probed by Inelastic X-ray Scattering.  
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Observation of Umklapp processes in disordered materials.  
T. Scopigno, M. D'Astuto, M. Krisch, F. Sette, and G. Ruocco.  
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