Stanford

Riccardo Bassiri

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Bio

BIO

Dr. Bassiri co-leads the materials research efforts of the Stanford LIGO Group. His research focuses on studying the materials used in the gravitational wave detector optics, for both current and future generations of detectors. He is also Deputy Director of the LIGO Scientific Collaboration Center for Coatings Research, which is a collaborative project involving eight US institutions that seeks to extend the reach of the next generation of gravitational wave detectors by addressing the dominant noise source limiting their performance, thermal noise in the interferometer mirrors.

ACADEMIC APPOINTMENTS

- Sr Res Scientist-Physical, Edward L. Ginzton Laboratory

ADMINISTRATIVE APPOINTMENTS

- SPRC Consultant, Stanford Photonics Research Center, (2023- present)
- Deputy Director, LSC Center for Coatings Research, (2017- present)
- Honorary Research Fellow, University of Glasgow, (2013- present)

LINKS

- Stanford LIGO Group: http://ligo.stanford.edu

Publications

PUBLICATIONS

- **ePDFpy: A Python-based interactive GUI tool for electron pair distribution function analysis of amorphous materials *,**** *COMPUTER PHYSICS COMMUNICATIONS*
  Kim, M., Kim, P., Bassiri, R., Prasai, K., Fejer, M. M., Lee, K.
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- **Hydrogen-Induced Ultralow Optical Absorption and Mechanical Loss in Amorphous Silicon for Gravitational-Wave Detectors** *PHYSICAL REVIEW LETTERS*
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- **Effects of elevated-temperature deposition on the atomic structure of amorphous Ta₂O₅ films** *APL MATERIALS*
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- **Cryogenic mechanical loss of amorphous germania and titania-doped germania thin films** *CLASSICAL AND QUANTUM GRAVITY*
  Khadka, S., Markosyan, A., Prasai, K., Dana, A., Yang, L., Tait, S. C., Martin, I. W., Menoni, C. S., Fejer, M. M., Bassiri, R.

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- **Hidden structure in the medium-range order of amorphous zirconia-tantala films** *PHYSICAL REVIEW B*
  Mishkin, A., Jiang, J., Zhang, R., Cheng, H., Prasai, K., Bassiri, R., Fejer, M.
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- **Glass transition temperatures of binary oxides from ab initio simulations** *APL MATERIALS*
  Prasai, K., Bassiri, R., Cheng, H., Fejer, M. M.
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- **Amorphous Zirconia-doped Tantala modeling and simulations using explicit multi-element spectral neighbor analysis machine learning potentials (EME-SNAP)** *Physical Review Materials*
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- **Realistic computer models of amorphous ZrO2:Ta2O5: Structural, optical, and vibrational properties** *PHYSICAL REVIEW B*
  Thapa, R., Prasai, K., Bassiri, R., Fejer, M. M., Drabold, D. A.
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- **Low Mechanical Loss TiO2:GeO2 Coatings for Reduced Thermal Noise in Gravitational Wave Interferometers** *PHYSICAL REVIEW LETTERS*
  Vajente, G., Yang, L., Davenport, A., Fazio, M., Ananyeva, A., Zhang, L., Billingsley, G., Prasai, K., Markosyan, A., Bassiri, R., Fejer, M. M., Chicoine, M., Schiettekatte, et al
  2021; 127 (7)

- **Bulk and shear mechanical loss of titania-doped tantala** *PHYSICS LETTERS A*
  Abernathy, M., Harry, G., Newport, J., Fair, H., Kinley-Hanlon, M., Hickey, S., Jiffar, I., Gretarsson, A., Penn, S., Bassiri, R., Gustafson, E., Martin, L., Rowan, et al
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- **Effect of elevated substrate temperature deposition on the mechanical losses in tantala thin film coatings** *Classical and Quantum Gravity*
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- **Order, disorder and mixing: The atomic structure of amorphous mixtures of titania and tantala** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
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  2016; 438: 59-66

- **Medium range structural order in amorphous tantala spatially resolved with changes to atomic structure by thermal annealing** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
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- **Optical absorption of ion-beam sputtered amorphous silicon coatings** *PHYSICAL REVIEW D*
  Steinlechner, J., Martin, I. W., Bassiri, R., Bell, A., Fejer, M. M., Hough, J., Markosyan, A., Route, R. K., Rowan, S., Tornasi, Z.
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- **Observation of Gravitational Waves from a Binary Black Hole Merger** *PHYSICAL REVIEW LETTERS*

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- **Order, disorder and mixing: The atomic structure of amorphous mixtures of titania and tantala** *J. Non-Cryst. Solids*
  Bassiri, R., Abernathy, M. R., Liou, F., Mehta, A., Gustafson, E. k., Hart, M., Isa, H. N., Kim, N., Lin, A. C., MacLaren, I., Martin, I. W., Route, R. K., Rowan, et al
  2016; 438: 59-66
- **Medium range structural order in amorphous tantala spatially resolved with changes to atomic structure by thermal annealing** *Journal of Non-Crystalline Solids*
  Hart, M. J., Bassiri, R., Borisenko, K. B., Veron, M., Rauch, E. F., Martin, I. W., Rowan, S., MacLaren, I.
  2016; 438: 10-17
- **Structure of amorphous silica-hafnia and silica-zirconia thin-film materials: The role of a metastable equilibrium state in non-glass-forming oxide systems** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
  Kim, N., Bassiri, R., Fejer, M. M., Stebbins, J. F.
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- **Epitaxial growth of GaP/AlGaP mirrors on Si for low thermal noise optical coatings** *OPTICAL MATERIALS EXPRESS*
  Lin, A. C., Bassiri, R., Omar, S., Markosyan, A. S., Lantz, B., Route, R., Byer, R. L., Harris, J. S., Fejer, M. M.
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- **Order within disorder: The atomic structure of ion-beam sputtered amorphous tantala (a-Ta2O5)** *APL MATERIALS*
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- **The structure of ion beam sputtered amorphous alumina films and effects of Zn doping: High-resolution Al-27 NMR** *JOURNAL OF NON-CRYSTALLINE SOLIDS*
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  2014; 405: 1-6
- **Low temperature mechanical dissipation of an ion-beam sputtered silica film** *CLASSICAL AND QUANTUM GRAVITY*
  Martin, I. W., Nawrodt, R., Craig, K., Schwarz, C., BASSIRI, R., Harry, G., Hough, J., Penn, S., Reid, S., Robie, R., Rowan, S.
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  Kim, N., Bassiri, R., Fejer, M. M., Stebbins, J. F.
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- **Investigation of mechanical losses of thin silicon flexures at low temperatures** *CLASSICAL AND QUANTUM GRAVITY*
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- **Cryogenic mechanical loss measurements of heat-treated hafnium dioxide** *CLASSICAL AND QUANTUM GRAVITY*
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- **Probing the atomic structure of amorphous Ta2O5 coatings** *APPLIED PHYSICS LETTERS*
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2011; 98 (3)

- **Effect of heat treatment on mechanical dissipation in Ta2O5 coatings** *CLASSICAL AND QUANTUM GRAVITY*
  Martin, I. W., BASSIRI, R., Nawrodt, R., Fejer, M. M., Gretarsson, A., Gustafson, E., Harry, G., Hough, J., MacLaren, I., Penn, S., Reid, S., Route, R., Rowan, et al
  2010; 27 (22)
- **Comparison of the temperature dependence of the mechanical dissipation in thin films of Ta2O5 and Ta2O5 doped with TiO2** *CLASSICAL AND QUANTUM GRAVITY*
  Martin, I. W., Chalkley, E., Nawrodt, R., Armandula, H., BASSIRI, R., Comtet, C., Fejer, M. M., Gretarsson, A., Harry, G., Heinert, D., Hough, J., MacLaren, I., Michel, et al
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  Abbott, R., Abe, H., Acernese, F., Ackley, K., Adhicary, S., Adhikari, N., Adhikari, R. X., Adkins, V. K., Adya, V. B., Affeldt, C., Agarwal, D., Agathos, M., Aguiar, et al
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- **Constraints on the Cosmic Expansion History from GWTC-3** *ASTROPHYSICAL JOURNAL*
  Abbott, R., Abe, H., Acernese, F., Ackley, K., Adhikari, N., Adhikari, R. X., Adkins, V. K., Adya, V. B., Affeldt, C., Agarwal, D., Agathos, M., Agatsuma, K., Aggarwal, et al
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- **Model-based Cross-correlation Search for Gravitational Waves from the Low-mass X-Ray Binary Scorpius X-1 in LIGO O3 Data** *ASTROPHYSICAL JOURNAL LETTERS*
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- **GWTC-2: Compact Binary Coalescences Observed by LIGO and Virgo during the First Half of the Third Observing Run** *PHYSICAL REVIEW X*
  Abbott, R., Abbott, T. D., Abraham, S., Acernese, F., Ackley, K., Adams, A., Adams, C., Adhikari, R. X., Adya, V. B., Affeldt, C., Agathos, M., Agatsuma, K., Aggarwal, et al
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- **Annealing-Induced Changes in the Atomic Structure of Amorphous Silica, Germania, and Tantala Using Accelerated Molecular Dynamics** *PHYSICA STATUS SOLIDI B-BASIC SOLID STATE PHYSICS*
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- **Analysis of two-level systems and mechanical loss in amorphous ZrO2-doped Ta2O5 by non-cage-breaking and cage-breaking transitions** *JOURNAL OF CHEMICAL PHYSICS*
  Jiang, J., Mishkin, A. S., Prasai, K., Zhang, R., Yazback, M., Bassiri, R., Fejer, M. M., Cheng, H.
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- **Argon bubble formation in tantalum oxide-based films for gravitational wave interferometer mirrors** *OPTICAL MATERIALS EXPRESS*
  Cummings, R. B., Bassiri, R., Martin, I. W., MacLaren, I.
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- **Survey of metal oxides for coatings of ultra-stable optical cavities**
  Menoni, C. S., Yang, L., Fazio, M., Vajente, G., Ananyeva, A., Billingsley, G., Schiettekatte, F., Chicoine, M., Markosyan, A., Bassiri, R., Fejer, M. M., IEEE
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- **Structural Evolution that Affects the Room-Temperature Internal Friction of Binary Oxide Nanolaminates: Implications for Ultrastable Optical Cavities** *ACS APPLIED NANO MATERIALS*
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  Terkowski, L., Martin, I. W., Axmann, D., Behrendsen, M., Pein, F., Bell, A., Schnabel, R., Bassiri, R., Fejer, M. M., Hough, J., Markosyan, A., Rowan, S., Steinlechner, et al
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- **Structure and morphology of low mechanical loss TiO2-doped Ta2O5** *OPTICAL MATERIALS EXPRESS*
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- **Investigation of effects of assisted ion bombardment on mechanical loss of sputtered tantala thin films for gravitational wave interferometers** *PHYSICAL REVIEW D*
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- **All-sky search for long-duration gravitational-wave transients in the second Advanced LIGO observing run** *PHYSICAL REVIEW D*
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- **First Measurement of the Hubble Constant from a Dark Standard Siren using the Dark Energy Survey Galaxies and the LIGO/Virgo Binary-Black-hole Merger GW170814** *ASTROPHYSICAL JOURNAL LETTERS*
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- **Search for Gravitational Waves from a Long-lived Remnant of the Binary Neutron Star Merger GW170817** *ASTROPHYSICAL JOURNAL*
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- **Search for Transient Gravitational-wave Signals Associated with Magnetar Bursts during Advanced LIGO's Second Observing Run** *ASTROPHYSICAL JOURNAL*

Abbott, B. P., Abbott, R., Abbott, T. D., Abraham, S., Acernese, F., Ackley, K., Adams, C., Adhikari, R. X., Adya, V. B., Affeldt, C., Agathos, M., Agatsuma, K., Aggarwal, et al

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- **Constraining the p-Mode-g-Mode Tidal Instability with GW170817** *PHYSICAL REVIEW LETTERS*

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- **A Fermi Gamma-Ray Burst Monitor Search for Electromagnetic Signals Coincident with Gravitational-wave Candidates in Advanced LIGO's First Observing Run** *ASTROPHYSICAL JOURNAL*

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- **Search for Multimessenger Sources of Gravitational Waves and High-energy Neutrinos with Advanced LIGO during Its First Observing Run, ANTARES, and IceCube** *ASTROPHYSICAL JOURNAL*

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- **Properties of the Binary Neutron Star Merger GW170817** *PHYSICAL REVIEW X*

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- **GW170817: Measurements of Neutron Star Radii and Equation of State** *PHYSICAL REVIEW LETTERS*

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  2018; 121 (16)

- **Effects of waveform model systematics on the interpretation of GW150914** *CLASSICAL AND QUANTUM GRAVITY*

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- **First Search for Gravitational Waves from Known Pulsars with Advanced LIGO** *ASTROPHYSICAL JOURNAL*

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- **Calibration of the Advanced LIGO detectors for the discovery of the binary black-hole merger GW150914** *PHYSICAL REVIEW D*

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- **Upper Limits on the Stochastic Gravitational-Wave Background from Advanced LIGO's First Observing Run** *PHYSICAL REVIEW LETTERS*

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