

# Stanford

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## Amir Safavi-Naeini

Associate Professor of Applied Physics and, by courtesy, of Electrical Engineering

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### Bio

#### ACADEMIC APPOINTMENTS

- Associate Professor, Applied Physics
- Associate Professor (By courtesy), Electrical Engineering

#### PROFESSIONAL EDUCATION

- Ph.D., California Institute of Technology , Applied Physics (2013)
- B.A.Sc., University of Waterloo , Electrical Engineering (2008)

#### PATENTS

- Jeremy D Witmer, Patricio Arrangoiz-Arriola, Jeff T Hill, Amir H Safavi-Naeini, Timothy Patrick McKenna. "United States Patent US20180113373A1 Doubly-resonant electro-optic conversion using a superconducting microwave resonator", Leland Stanford Junior University, Oct 23, 2017
- Oskar Painter, Martin WINGER, Qiang Lin, Amir SAFAVI-NAEINI, Thiago ALEGRE, Timothy Dobson BLASIUS, Alexander Grey KRAUSE. "United States Patent US20130121633 A1 Systems and methods for tuning a cavity", California Institute Of Technology, Nov 11, 2011

#### LINKS

- Lab Site: <https://web.stanford.edu/~safavi/>

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### Teaching

#### COURSES

##### 2023-24

- Atoms, Fields and Photons: APPPHYS 203 (Aut)
- Quantum Hardware: APPPHYS 228 (Win)

##### 2022-23

- Atoms, Fields and Photons: APPPHYS 203 (Aut)
- Quantum Hardware: APPPHYS 228 (Win)

##### 2021-22

- Atoms, Fields and Photons: APPPHYS 203 (Aut)
- Quantum Hardware: APPPHYS 228 (Win)

##### 2020-21

- Atoms, Fields and Photons: APPPHYS 203 (Aut)
- Quantum Hardware: APPPHYS 228 (Win)

## STANFORD ADVISEES

### Doctoral Dissertation Reader (AC)

Sahil Dagli, Beicheng Lou, Sattwik Deb Mishra, Tiffany Paul, Michelle Wu, Joshua Yang, Cady van Assendelft

### Postdoctoral Faculty Sponsor

Samuel Gyger, Ali Khalatpour, Hubert Stokowski

### Doctoral Dissertation Advisor (AC)

Nancy Ammar, Oguz Tolga Celik, Rachel Gruenke, Jason Herrmann, Oliver Hitchcock, Alex Hwang, Takuma Makihara, Sultan Malik, Felix Mayor, Kevin Multani, Taewon Park, Taha Rajabzadeh

### Doctoral (Program)

Jason Herrmann, Vasily Kruzhilin, Sze Cheung Lau, Kejun Xu

## Publications

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### PUBLICATIONS

- **Surface modification and coherence in lithium niobate SAW resonators.** *Scientific reports*  
Gruenke, R. G., Hitchcock, O. A., Wollack, E. A., Sarabalis, C. J., Jankowski, M., McKenna, T. P., Lee, N. R., Safavi-Naeini, A. H.  
2024; 14 (1): 6663
- **Single-mode squeezed-light generation and tomography with an integrated optical parametric oscillator.** *Science advances*  
Park, T., Stokowski, H., Ansari, V., Gyger, S., Multani, K. K., Celik, O. T., Hwang, A. Y., Dean, D. J., Mayor, F., McKenna, T. P., Fejer, M. M., Safavi-Naeini, A.  
2024; 10 (11): ead11814
- **Integrated frequency-modulated optical parametric oscillator.** *Nature*  
Stokowski, H. S., Dean, D. J., Hwang, A. Y., Park, T., Celik, O. T., McKenna, T. P., Jankowski, M., Langrock, C., Ansari, V., Fejer, M. M., Safavi-Naeini, A. H.  
2024; 627 (8002): 95-100
- **Arbitrary electro-optic bandwidth and frequency control in lithium niobate optical resonators.** *Optics express*  
Herrmann, J. F., Dean, D. J., Sarabalis, C. J., Ansari, V., Multani, K., Wollack, E. A., McKenna, T. P., Witmer, J. D., Safavi-Naeini, A. H.  
2024; 32 (4): 6168-6177
- **Strong Dispersive Coupling Between a Mechanical Resonator and a Fluxonium Superconducting Qubit** *PRX QUANTUM*  
Lee, N. A., Guo, Y., Cleland, A. Y., Wollack, E., Gruenke, R. G., Makihara, T., Wang, Z., Rajabzadeh, T., Jiang, W., Mayor, F. M., Arrangoiz-Arriola, P., Sarabalis, C. J., Safavi-Naeini, et al  
2023; 4 (4)
- **Efficient Photonic Integration of Diamond Color Centers and Thin-Film Lithium Niobate** *ACS PHOTONICS*  
Riedel, D., Lee, H., Herrmann, J. F., Grzesik, J., Ansari, V., Borit, J., Stokowski, H. S., Aghaeimeibodi, S., Lu, H., McQuade, P. J., Melosh, N. A., Shen, Z., Safavi-Naeini, et al  
2023; 10 (12): 4236-4243
- **Mid-infrared spectroscopy with a broadly tunable thin-film lithium niobate optical parametric oscillator** *OPTICA*  
Hwang, A., Stokowski, H. S., Park, T., Jankowski, M., McKenna, T. P., Langrock, C., Mishra, J., Ansari, V., Fejer, M. M., Safavi-Naeini, A. H.  
2023; 10 (11): 1535-1542
- **Analysis of arbitrary superconducting quantum circuits accompanied by a Python package: SQcircuit** *QUANTUM*  
Rajabzadeh, T., Wang, Z., Lee, N., Makihara, T., Guo, Y., Safavi-Naeini, A. H.  
2023; 7
- **Flexible integration of gigahertz nanomechanical resonators with a superconducting microwave resonator using a bonded flip-chip method** *APPLIED PHYSICS LETTERS*  
Malik, S., Jiang, W., Mayor, F. M., Makihara, T., Safavi-Naeini, A. H.  
2023; 123 (10)

- **Identifying the Microscopic Nature of Two Level System Loss Channels in Acoustic Devices Using X-ray Photoelectron Spectroscopy and Atomic Force Microscopy.** *Microscopy and microanalysis : the official journal of Microscopy Society of America, Microbeam Analysis Society, Microscopical Society of Canada*  
Gruenke, R., Multani, G., Hitchcock, O., Wollack, E. A., Szakiel, E., Sarabalis, C., Lee, N., Cleland, A., Safavi-Naeini, A.  
2023; 29 (Supplement\_1): 776
- **Optically heralded microwave photon addition** *NATURE PHYSICS*  
Jiang, W., Mayor, F. M., Malik, S., Van Laer, R., McKenna, T. P., Patel, R. N., Witmer, J. D., Safavi-Naeini, A. H.  
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- **Integrated quantum optical phase sensor in thin film lithium niobate.** *Nature communications*  
Stokowski, H. S., McKenna, T. P., Park, T., Hwang, A. Y., Dean, D. J., Celik, O. T., Ansari, V., Fejer, M. M., Safavi-Naeini, A. H.  
2023; 14 (1): 3355
- **Platform-agnostic waveguide integration of high-speed photodetectors with evaporated tellurium thin films** *OPTICA*  
Ahn, G., White, A. D., Kim, H., Higashitarumizu, N., Mayor, F. M., Herrmann, J. F., Jiang, W., Multani, K. S., Safavi-Naeini, A. H., Javey, A., Vuckovic, J.  
2023; 10 (3): 349-355
- **Bias-stable Sub-Volt Visible Electro-optic Modulator in Thin-Film Lithium Niobate**  
Celik, O., Ammar, N., Stokowski, H. S., Park, T., Safavi-Naeini, A., IEEE  
IEEE.2023
- **Tunable dual wavelength laser on thin film lithium niobate**  
Lufungula, I., Mayor, F. M., Herrmann, J. F., Park, T., Stokowski, H. S., Hwang, A. Y., De Beeck, C., Atalar, O., Jiang, W., Kuyken, B., Safavi-Naeini, A. H., IEEE  
IEEE.2023
- **Y-Z cut lithium niobate longitudinal piezoelectric resonant photoelastic modulator** *OPTICS EXPRESS*  
Atalar, O., Yee, S., Safavi-Naeini, A., Arbabian, A.  
2022; 30 (26): 47103-47114
- **Integrated passive nonlinear optical isolators** *NATURE PHOTONICS*  
White, A. D., Ahn, G., Gasse, K., Yang, K., Chang, L., Bowers, J. E., Vuckovic, J.  
2022
- **Ultra-broadband mid-infrared generation in dispersion-engineered thin-film lithium niobate** *OPTICS EXPRESS*  
Mishra, J., Jankowski, M., Hwang, A. Y., Stokowski, H. S., McKenna, T. P., Langrock, C., Ng, E., Heydari, D., Mabuchi, H., Safavi-Naeini, A. H., Fejer, M. M.  
2022; 30 (18): 32752-32760
- **Ultra-low-power second-order nonlinear optics on a chip.** *Nature communications*  
McKenna, T. P., Stokowski, H. S., Ansari, V., Mishra, J., Jankowski, M., Sarabalis, C. J., Herrmann, J. F., Langrock, C., Fejer, M. M., Safavi-Naeini, A. H.  
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- **Mirror symmetric on-chip frequency circulation of light** *NATURE PHOTONICS*  
Herrmann, J. F., Ansari, V., Wang, J., Witmer, J. D., Fan, S., Safavi-Naeini, A. H.  
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- **High-bandwidth CMOS-voltage-level electro-optic modulation of 780 nm light in thin-film lithium niobate** *OPTICS EXPRESS*  
Celik, O., Sarabalis, C. J., Mayor, F. M., Stokowski, H. S., Herrmann, J. F., McKenna, T. P., Lee, N. A., Jiang, W., Multani, K. S., Safavi-Naeini, A. H.  
2022; 30 (13): 23177-23186
- **High-efficiency second harmonic generation of blue light on thin-film lithium niobate.** *Optics letters*  
Park, T., Stokowski, H. S., Ansari, V., McKenna, T. P., Hwang, A. Y., Fejer, M. M., Safavi-Naeini, A. H.  
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- **Automated Discovery of Autonomous Quantum Error Correction Schemes** *PRX QUANTUM*  
Wang, Z., Rajabzadeh, T., Lee, N., Safavi-Naeini, A. H.  
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- **Quantum state preparation and tomography of entangled mechanical resonators.** *Nature*  
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- **Longitudinal piezoelectric resonant photoelastic modulator for efficient intensity modulation at megahertz frequencies.** *Nature communications*  
Atalar, O., Van Laer, R., Safavi-Naeini, A. H., Arbabian, A.  
2022; 13 (1): 1526
- **Building a Fault-Tolerant Quantum Computer Using Concatenated Cat Codes** *PRX QUANTUM*  
Chamberland, C., Noh, K., Arrangoiz-Arriola, P., Campbell, E. T., Hann, C. T., Iverson, J., Putterman, H., Bohdanowicz, T. C., Flammia, S. T., Keller, A., Refael, G., Preskill, J., Jiang, et al  
2022; 3 (1)
- **2022 Roadmap on integrated quantum photonics** *JOURNAL OF PHYSICS-PHOTONICS*  
Moody, G., Sorger, V. J., Blumenthal, D. J., Juodawlkis, P. W., Loh, W., Sorace-Agaskar, C., Jones, A. E., Balram, K. C., Matthews, J. F., Laing, A., Davanco, M., Chang, L., Bowers, et al  
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- **Superconducting on-chip tunable mm-wave resonator**  
Das, D., Naji, A., Multani, K. S., Safavi-Naeini, A. H., Nanni, E. A., IEEE  
IEEE.2022
- **III/V-on-lithium niobate amplifiers and lasers** *OPTICA*  
de Beeck, C., Mayor, F. M., Cuyvers, S., Poelman, S., Herrmann, J. F., Atalar, O., McKenna, T. P., Haq, B., Jiang, W., Witmer, J. D., Roelkens, G., Safavi-Naeini, A. H., Van Laer, et al  
2021; 8 (10): 1288-1289
- **Control Design for Inhomogeneous-Broadening Compensation in Single-Photon** *PHYSICAL REVIEW APPLIED*  
Mishra, S., Trivedi, R., Safavi-Naeini, A. H., Vuckovic, J.  
2021; 16 (4)
- **Mid-infrared nonlinear optics in thin-film lithium niobate on sapphire** *OPTICA*  
Mishra, J., McKenna, T. P., Ng, E., Stokowski, H. S., Jankowski, M., Langrock, C., Heydari, D., Mabuchi, H., Fejer, M. M., Safavi-Naeini, A. H.  
2021; 8 (6): 921-924
- **Number Partitioning With Grover's Algorithm in Central Spin Systems** *PRX QUANTUM*  
Anikeeva, G., Markovic, O., Borish, V., Hines, J. A., Rajagopal, S., Cooper, E. S., Perival, A., Safavi-Naeini, A., Davis, E. J., Schleier-Smith, M.  
2021; 2 (2)
- **Acousto-optic modulation of a wavelength-scale waveguide** *OPTICA*  
Sarabalis, C. J., Van Laer, R., Patel, R. N., Dahmani, Y. D., Jiang, W., Mayor, F. M., Safavi-Naeini, A. H.  
2021; 8 (4): 477-483
- **Loss channels affecting lithium niobate phononic crystal resonators at cryogenic temperature** *APPLIED PHYSICS LETTERS*  
Wollack, E., Cleland, A. Y., Arrangoiz-Arriola, P., McKenna, T. P., Gruenke, R. G., Patel, R. N., Jiang, W., Sarabalis, C. J., Safavi-Naeini, A. H.  
2021; 118 (12)
- **Development of Quantum Interconnects (QuICs) for Next-Generation Information Technologies** *PRX QUANTUM*  
Awschalom, D., Berggren, K. K., Bernien, H., Bhave, S., Carr, L. D., Davids, P., Economou, S. E., Englund, D., Faraon, A., Fejer, M., Guha, S., Gustafsson, M., Hu, et al  
2021; 2 (1)
- **Gigahertz Phononic Integrated Circuits on Thin-Film Lithium Niobate on Sapphire** *PHYSICAL REVIEW APPLIED*  
Mayor, F. M., Jiang, W., Sarabalis, C. J., McKenna, T. P., Witmer, J. D., Safavi-Naeini, A. H.  
2021; 15 (1)
- **Fully-Resonant Second Harmonic Generation in Periodically Poled Thin-Film Lithium Niobate**  
McKenna, T. P., Stokowski, H. S., Ansari, V., Mishra, J., Jankowski, M., Sarabalis, C. J., Herrmann, J. F., Langrock, C., Fejer, M. M., Safavi-Naeini, A. H., IEEE  
IEEE.2021
- **Room-Temperature Mechanical Resonator with a Single Added or Subtracted Phonon.** *Physical review letters*  
Patel, R. N., McKenna, T. P., Wang, Z., Witmer, J. D., Jiang, W., Van Laer, R., Sarabalis, C. J., Safavi-Naeini, A. H.  
2021; 127 (13): 133602

- **Photonic Modal Circulator Using Temporal Refractive-Index Modulation with Spatial Inversion Symmetry.** *Physical review letters*  
Wang, J., Herrmann, J. F., Witmer, J. D., Safavi-Naeini, A. H., Fan, S.  
2021; 126 (19): 193901
- **Quantum Control of Microwave-to-Optical Transducers for Inhomogeneous Broadening Compensation**  
Mishra, S., Trivedi, R., Safavi-Naeini, A. H., Vuckovic, J., IEEE  
IEEE.2021
- **Integrated thin-film lithium niobate non-reciprocal circulator**  
Herrmann, J. F., Ansari, V., Wang, J., Witmer, J. D., Fan, S., Safavi-Naeini, A. H., IEEE  
IEEE.2021
- **Photonic modal circulator using dynamic modulation with mirror symmetry**  
Wang, J., Herrmann, J., Witmer, J., Safavi-Naeini, A. H., Fan, S., IEEE  
IEEE.2021
- **Mid-infrared nonlinear optics in thin-film lithium niobate on sapphire**  
Mishra, J., McKenna, T. P., Ng, E., Stokowski, H. S., Jankowski, M., Langrock, C., Heydari, D., Mabuchi, H., Safavi-Naeini, A. H., Fejer, M. M., IEEE  
IEEE.2021
- **Optical Parametric Oscillator in Thin-Film Lithium Niobate with a 130 mW Threshold**  
Stokowski, H. S., McKenna, T. P., Ansari, V., Mishra, J., Jankowski, M., Sarabalis, C. J., Herrmann, J. F., Langrock, C., Fejer, M. M., Safavi-Naeini, A. H., IEEE  
IEEE.2021
- **Cryogenic microwave-to-optical conversion using a triply resonant lithium-niobate-on-sapphire transducer** *OPTICA*  
McKenna, T. P., Witmer, J. D., Patel, R. N., Jiang, W., Van Laer, R., Arrangoiz-Arriola, P., Wollack, E., Herrmann, J. F., Safavi-Naeini, A. H.  
2020; 7 (12): 1737–45
- **Nanobenders as efficient piezoelectric actuators for widely tunable nanophotonics at CMOS-level voltages** *COMMUNICATIONS PHYSICS*  
Jiang, W., Mayor, F. M., Patel, R. N., McKenna, T. P., Sarabalis, C. J., Safavi-Naeini, A. H.  
2020; 3 (1)
- **Acousto-optic modulation in lithium niobate on sapphire** *APL PHOTONICS*  
Sarabalis, C. J., McKenna, T. P., Patel, R. N., Van Laer, R., Safavi-Naeini, A. H.  
2020; 5 (8)
- **A silicon-organic hybrid platform for quantum microwave-to-optical transduction** *QUANTUM SCIENCE AND TECHNOLOGY*  
Witmer, J. D., McKenna, T. P., Arrangoiz-Arriola, P., Van Laer, R., Alex Wollack, E., Lin, F., Jen, A., Luo, J., Safavi-Naeini, A. H.  
2020; 5 (3)
- **Piezoelectric Transduction of a Wavelength-Scale Mechanical Waveguide** *PHYSICAL REVIEW APPLIED*  
Dahmani, Y. D., Sarabalis, C. J., Jiang, W., Mayor, F. M., Safavi-Naeini, A. H.  
2020; 13 (2)
- **Time-of-flight imaging based on resonant photoelastic modulation (vol 58, pg 2235, 2019)** *APPLIED OPTICS*  
Atalar, O., Van Laer, R., Sarabalis, C. J., Safavi-Naeini, A. H., Arbabian, A.  
2020; 59 (5): 1430
- **S-band delay lines in suspended lithium niobate** *JOURNAL OF APPLIED PHYSICS*  
Sarabalis, C. J., Dahmani, Y. D., Cleland, A. Y., Safavi-Naeini, A. H.  
2020; 127 (5)
- **Lithium Niobate Resonant Photoelastic Modulator for Time-of-Flight Imaging**  
Atalar, O., Van Laer, R., Sarabalis, C. J., Safavi-Naeini, A. H., Arbabian, A., IEEE  
IEEE.2020
- **Development of a Millimeter-Wave Transducer for Quantum Networks**  
Multani, K. S., Stokowski, H., Snively, E., Patel, R., Jiang, W., Lee, N., Welander, P. B., Nanni, E. A., Safavi-Naeini, A. H., IEEE  
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- **Efficient bidirectional piezo-optomechanical transduction between microwave and optical frequency.** *Nature communications*  
Jiang, W. n., Sarabalis, C. J., Dahmani, Y. D., Patel, R. N., Mayor, F. M., McKenna, T. P., Van Laer, R. n., Safavi-Naeini, A. H.  
2020; 11 (1): 1166
- **Photonics-to-Free-Space Interface in Lithium Niobate-on-Sapphire**  
Rajabzadeh, T., Sarabalis, C. J., Atalar, O., Safavi-Naeini, A. H., IEEE  
IEEE.2020
- **Acousto-Optics in Lithium Niobate-on-Sapphire**  
Sarabalis, C. J., McKenna, T. P., Patel, R. N., Safavi-Naeini, A. H., IEEE  
IEEE.2020
- **Efficient bidirectional piezo-optomechanical transduction between microwave and optical frequency**  
Jiang, W., Sarabalis, C. J., Dahmani, Y. D., Patel, R. N., Mayor, F. M., McKenna, T. P., Van Laer, R., Safavi-Naeini, A. H., IEEE  
IEEE.2020
- **Nanobenders: efficient piezoelectric actuators for widely tunable nanophotonics at CMOS-level voltages**  
Jiang, W., Mayor, F. M., Patel, R. N., McKenna, T. P., Sarabalis, C. J., Safavi-Naeini, A. H., IEEE  
IEEE.2020
- **Piezo-optomechanics in lithium niobate on silicon-on-insulator for microwave-to-optics transduction**  
Van Laer, R., Jiang, W., Patel, R. N., Sarabalis, C. J., Cleland, A., McKenna, T. P., Wollack, E., Witmer, J. D., Safavi-Naeini, A. H., IEEE  
IEEE.2020
- **Mechanical Purcell filters for microwave quantum machines** *APPLIED PHYSICS LETTERS*  
Cleland, A. Y., Pechal, M., Stas, P. C., Sarabalis, C. J., Wollack, E., Safavi-Naeini, A. H.  
2019; 115 (26)
- **Cryogenic packaging of an optomechanical crystal** *OPTICS EXPRESS*  
McKenna, T. P., Patel, R. N., Witmer, J. D., Van Laer, R., Valery, J. A., Safavi-Naeini, A. H.  
2019; 27 (20): 28782–91
- **Lithium niobate piezo-optomechanical crystals** *OPTICA*  
Jiang, W., Patel, R. N., Mayor, F. M., McKenna, T. P., Arrangoiz-Arriola, P., Sarabalis, C. J., Witmer, J. D., Van Laer, R., Safavi-Naeini, A. H.  
2019; 6 (7): 845–53
- **Resolving the energy levels of a nanomechanical oscillator.** *Nature*  
Arrangoiz-Arriola, P., Wollack, E. A., Wang, Z., Pechal, M., Jiang, W., McKenna, T. P., Witmer, J. D., Van Laer, R., Safavi-Naeini, A. H.  
2019; 571 (7766): 537–40
- **Quantum Dynamics of a Few-Photon Parametric Oscillator** *PHYSICAL REVIEW X*  
Wang, Z., Pechal, M., Wollack, E., Arrangoiz-Arriola, P., Gao, M., Lee, N. R., Safavi-Naeini, A. H.  
2019; 9 (2)
- **Controlling phonons and photons at the wavelength scale: integrated photonics meets integrated photonics (vol 6, pg 213, 2019)** *OPTICA*  
Safavi-Naeini, A. H., Van Thourhout, D., Baets, R., Van Laer, R.  
2019; 6 (4): 410
- **Diamond optomechanical crystals with embedded nitrogen-vacancy centers** *QUANTUM SCIENCE AND TECHNOLOGY*  
Cady, J., Michel, O., Lee, K. W., Patel, R. N., Sarabalis, C. J., Safavi-Naeini, A. H., Jayich, A.  
2019; 4 (2)
- **Time-of-flight imaging based on resonant photoelastic modulation** *APPLIED OPTICS*  
Atalar, O., Van Laer, R., Sarabalis, C. J., Safavi-Naeini, A. H., Arbabian, A.  
2019; 58 (9): 2235–47
- **Controlling phonons and photons at the wavelength scale: integrated photonics meets integrated photonics** *OPTICA*  
Safavi-Naeini, A. H., Van Thourhout, D., Baets, R., Van Laer, R.  
2019; 6 (2): 213–32

- **Superconducting circuit quantum computing with nanomechanical resonators as storage** *QUANTUM SCIENCE AND TECHNOLOGY*  
Pechal, M., Arrangoiz-Arriola, P., Safavi-Naeini, A. H.  
2019; 4 (1)
- **Electro-Optics with Gigahertz Phonons in Silicon Photonics**  
Van Laer, R., Patel, R. N., Witmer, J. D., McKenna, T. P., Safavi-Naeini, A. H., IEEE  
IEEE.2019
- **High-quality Lithium Niobate Optomechanical Crystal**  
Jiang, W., Patel, R. N., Mayor, F. M., McKenna, T. P., Arrangoiz-Arriola, P., Sarabalis, C. J., Van Laer, R., Safavi-Naeini, A. H., IEEE  
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- **Quantum Acoustics with Lithium Niobate Nanocavities**  
Arrangoiz-Arriola, P., Wollack, E., Pechal, M., Jiang, W., Wang, Z., McKenna, T. P., Safavi-Naeini, A. H., IEEE  
IEEE.2019
- **Frequency Tunable Single-Photon Emission From a Single Atomic Defect in a Solid**  
Sun, S., Zhang, J., Fischer, K. A., Burek, M. J., Dory, C., Lagoudakis, K. G., Tzeng, Y., Radulaski, M., Kelaita, Y., Safavi-Naeini, A., Shen, Z., Melosh, N. A.,  
Chu, et al  
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- **Microwave Quantum Acoustic Processor**  
Arrangoiz-Arriola, P., Wollack, E., Pechal, M., Jiang, W., Wang, Z., McKenna, T. P., Witmer, J., Van Laer, R., Cleland, A., Lee, N., Sarabalis, C. J., Stas, P.,  
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- **Painting Nonclassical States of Spin or Motion with Shaped Single Photons.** *Physical review letters*  
Davis, E. J., Wang, Z., Safavi-Naeini, A. H., Schleier-Smith, M. H.  
2018; 121 (12): 123602
- **Painting Nonclassical States of Spin or Motion with Shaped Single Photons** *PHYSICAL REVIEW LETTERS*  
Davis, E. J., Wang, Z., Safavi-Naeini, A. H., Schleier-Smith, M. H.  
2018; 121 (12)
- **Cavity-Enhanced Raman Emission from a Single Color Center in a Solid.** *Physical review letters*  
Sun, S., Zhang, J. L., Fischer, K. A., Burek, M. J., Dory, C., Lagoudakis, K. G., Tzeng, Y., Radulaski, M., Kelaita, Y., Safavi-Naeini, A., Shen, Z., Melosh, N. A.,  
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2018; 121 (8): 083601
- **Optomechanical antennas for on-chip beam-steering** *OPTICS EXPRESS*  
Sarabalis, C. J., Van Laer, R., Safavi-Naeini, A. H.  
2018; 26 (17): 22075–99
- **Single-Mode Phononic Wire.** *Physical review letters*  
Patel, R. N., Wang, Z., Jiang, W., Sarabalis, C. J., Hill, J. T., Safavi-Naeini, A. H.  
2018; 121 (4): 040501
- **Single-Mode Phononic Wire** *PHYSICAL REVIEW LETTERS*  
Patel, R. N., Wang, Z., Jiang, W., Sarabalis, C. J., Hill, J. T., Safavi-Naeini, A. H.  
2018; 121 (4)
- **Coupling a Superconducting Quantum Circuit to a Phononic Crystal Defect Cavity** *PHYSICAL REVIEW X*  
Arrangoiz-Arriola, P., Wollack, E., Pechal, M., Witmer, J. D., Hill, J. T., Safavi-Naeini, A. H.  
2018; 8 (3)
- **Enhancing a slow and weak optomechanical nonlinearity with delayed quantum feedback** *NATURE COMMUNICATIONS*  
Wang, Z., Safavi-Naeini, A. H.  
2017; 8: 15886
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