

**Vitae**  
**ROBERT EDWIN PEALE**

Professor

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**EDUCATION:**

- Postdoctoral experience, 1989-1991, Lehigh University, “DX centers in AlGaAs,” Advisor: G. D. Watkins.
- Ph.D. in Physics 1990, Cornell University, Dissertation: “IR Studies of Chemical Splittings, Triplet Levels, and Tunneling States at Electronic Defects in Si,” Advisor: A. J. Sievers.
- M.S. in Physics 1986, Cornell University.
- B.A. in Physics 1983, University of California, Berkeley

**EMPLOYMENT:**

- Professor, Department of Physics 2003-present
- Associate Professor, Department of Physics, 1996 – 2003.
- Assistant Professor, Department of Physics, University of Central Florida, 1991-1996.
- Research Associate, Department of Physics, Lehigh University, 1989 to 1991.
- Research Assistant, Cornell Univ., Lab of Atomic and Solid State Physics, 1985-1989.
- Teaching Assistant, Cornell University, Department of Physics, 1983-1985.
- Technical Staff, Santa Barbara Research Center, detector characterization lab, 1982 and 1983.

**AWARDS:**

- Three time recipient of the NASA/ASEE Summer Faculty Fellowship.
- Three time recipient of AFOSR/ASEE Summer Faculty Fellowship (2005, 2006, and 2007)
- Winner of UCF Research Incentive Award April 2002.

**EXTERNAL RECOGNITION**

- 29 invitations to present research at Colleges, Universities, National Labs, Conferences and Workshops.
- 879 citations of published papers according to Web of Science as of 06/05/2014.
- H-index = 17.
- 4 invitations to NSF panel reviews.
- Chaired 3 conference sessions.

**PROFESSIONAL AFFILIATIONS**

- American Physical Society
- Optical Society of America
- SPIE

## TEACHING

### Classroom instruction

- University Physics I (5 times)
- College Physics II (3 times)
- Quantum mechanics I and II (4 times)
- Electricity and Magnetism I&II (3 times)
- Thermal Physics (4 times)
- Classical Mechanics
- Electronics (3 times)
- Physics of Scientific Instruments
- Graduate Summer Research Seminar (3 times)
- Graduate “Building Physics Apparatus” (4 times)
- Graduate Electrodynamics I (6 times)
- Graduate Electrodynamics II (7 times)
- Elasticity (1 time)
- Teaching evaluations are above average for the UCF Department of Physics.

### Extensive research supervision and training

- 4 Postdoctoral Research Associates supervised.
- 9 PhD degree dissertations supervised.
- 8 PhD dissertation in progress.
- 8 MSc theses supervised.
- 22 Undergraduate research projects supervised.

### Course and program creation

- Led recent PhD and MSc program revisions as graduate coordinator,
- Created summer research seminar as part of required graduate core.
- Created graduate course Building Physics Apparatus
- Created upper division majors course Elasticity, theory and experimental labs
- Recruitment efforts netted substantial increase in graduate enrollment, higher quality of recruits, and higher percentage of in-state enrollment.

### Postdoctoral Research Associates Supervised

1. Dr. Andrei Muravjov, from Institute for Physics of Microstructures, Russian Academy of Sciences, Nizhny Novgorod, “*Experimental studies of the far-infrared p-Ge laser,*” and “*Terahertz intracavity laser absorption spectrometer,*” 1997-present.
2. Dr. Remco Strijbos, from Technical University of Delft, The Netherlands, “*Theoretical studies of far-infrared emission in p-type Germanium*” (1997-1999).
3. Dr. Elena Flitsiyan, UCF Adjunct Professor, “*Neutron transmutation doping of p-Ge laser material*” (2000-2002).
4. Dr. Tatiana Brusentsova, from Mendelyev Institute Moscow, “*Far-infrared spectroscopy of mineral particles,*” (2008-2011).

### PhD Dissertations Supervised

1. Kijun Park, "*Studies of far-infrared/submillimeter p-type germanium laser*" (1997). Subsequent Employer: Korea Electric Power Research Institute.
2. Henry Weidner "*Energy transfer in Nd:KLiYF<sub>5</sub>*" (1998). Subsequent Employer: Veeco, metrology division.
3. Sandra Withers, "*Lanthanide-Calcite Interactions,*" (2002), Subsequent Employer: Lynntech, College Station TX.
4. Eric Nelson, "*Transmutation-doped far-IR p-Ge laser,*" (2003), Subsequent Employer: University of Louisville (Medical Physics resident).
5. Maxim Dolguikh, "Monte Carlo simulation of hole dynamics and terahertz amplification in multilayer delta doped semiconductor structures," (2005), Subsequent Employer: CAD Sciences, White Plains NY.
6. Himanshu Saxena, "Tunable terahertz detectors based on plasmon excitation in two dimensional electron gases in InGaAs/InP and AlGaIn/GaN HEMT, (2009), Subsequent Employer: Zyberwear Inc. Orlando FL
7. Justin Cleary, "Surface plasmon hosts for infrared waveguides and biosensors, and plasmons in gold-black nano-structured films," (2010), Subsequent Employer: Air Force Research Lab, Hanscom AFB MA.
8. Gautam Medhi, "Infrared intracavity laser absorption spectrometer," (2011).
9. Monas Shahzad, "Infrared surface plasmon polaritons on semiconductor, semimetal and conduction polymer" (2012).

### PhD dissertations in progress

1. Janardan Nath, "Cathodoluminescence study of surface plasmons on nano-structured metals."
2. Nima Nader, "Tunable terahertz plasmonic detector."
3. Deep Panjwani, "Metal-blacks for Plasmonic Enhancement of Solar Cell Efficiency."
4. Farnood Rezaie, "Planar integrated spectrometer."
5. Pedro Figueierdo, "Processing of Quantum Cascade Lasers for Intracavity Laser Absorption Spectrometer."
6. Imen Rezadad, "Scanning electron microscope imaging of MEMS electroscopes."
7. Evan Smith, "Noise properties of MEMS infrared sensor".
8. Mehmet Yesiltas, "Correlation of organic and mineral species in meteorites by infrared spectral microscopy."

### Masters Theses Supervised

1. Ray Ramotar, "*Fourier-transform spectroscopy of the triply-ionised lanthanides in lithium yttrium fluoride (LiYF<sub>4</sub>) and barium yttrium fluoride (BaY<sub>2</sub>F<sub>8</sub>)*" (1992).
2. Chris Fredricksen, "*Spectroscopy of S<sub>2</sub> microwave-sustained discharges,*" (1998).
3. Todd Du Bosq, "*Intracavity wavelength selectors for the p-Ge far-infrared laser,*" (2003).
4. Jorge Martinez, "Noise characterization for proposed UCF physical science building sites," (2006).
5. Justin Cleary, "Terahertz Fabry-Perot using multi-layer silicon dielectric mirrors," (2007).

6. Farnood Rezaie, "Microwave discharge spectroscopy of hot carbon monoxide," (2011)
7. Deep Panjwani, "Gold-black coatings for enhancement of solar cell efficiency," (2011).
8. Ammar Alhasan, "Casimir force in MEMS" (2014)

#### Undergraduate Research supervised

1. Patrick Summers, "*Site-selective photoluminescence spectroscopy of Nd<sup>3+</sup> in KLiYF<sub>5</sub>*"
2. Steven Granade, "*Site-selective photoluminescence spectroscopy of Nd<sup>3+</sup> in KYF<sub>4</sub>*."
3. Harold Williamson, "*Transfer optics for external chamber to Fourier spectrometer.*"
4. James Chung, "*Nitrogen laser pumped dye laser*"
5. Bill McClintic, "*Photoluminescence and IR absorption spectroscopy of porous Si*"
6. Matt McKaig, "*Ultraviolet Fourier transform spectroscopy of Nd<sup>3+</sup> and Gd<sup>3+</sup> doped fluoride crystals*"
7. Diana Downing, "*Luminescence dynamics of Er<sup>3+</sup> in K<sub>2</sub>YF<sub>5</sub>*"
8. Dan Vantoff, "*Spectroscopy of Nd<sup>3+</sup> in CsGd<sub>2</sub>F<sub>7</sub>*"
9. Alan Jamison, "*Electronics for whisker-contacting a far-infrared Schottky detector*"
10. William Trimble, "*Design and testing of a 100 W pulsed 450 MHz generator*"
11. Sandy Withers, "*Photoluminescence of GaAs/AlGaAs Multiple Quantum Wells*"
12. Alex Knoller "*Reflectance Modulation Spectroscopy*"
13. Jeff Donahue, "*Refocus Microscope for Depth Measurement*"
14. Patty Sharek, "*Computer control and data acquisition for grating spectrometer.*"
15. Forrest Ruhge, "High temperature diffusion and spectroscopy of Cu in GaAs."
16. William Carrier, "UV and heat induced changes in the spectrum of U:CaF<sub>2</sub>."
17. Justin Cleary, "Low temperature spectroscopic study of U:CaF<sub>2</sub>."
18. Jasen Enz, "*Far-IR Fabry Perot spectrometer.*"
19. Pedro Figueiredo, "Emission spectroscopy of hot vapors."
20. Doug Maukonen, "Low temperature far-infrared spectroscopy of mineral particles."
21. Seth Calhoon (Technician's apprentice)
22. Stephen Trewick (Technician's apprentice)

#### PhD dissertation committees

1. Margaret T. Perozzo "*Exciton saturation and spin relaxation in GaAs multiple quantum wells*" (1995)
2. Nicholas Madamopoulos, "*Ferroelectric liquid crystal device based photonic controllers for microwave antenna arrays*" (1998).
3. Adam L. Martin, "*Solid state microwave power amplifiers based on an extended resonance technique*" (1999).
4. Isaiah Olatunde Oladeji, "*Chemical bath deposition of II-VI compound thin films*" (1999).

5. Alexandra Rapaport “*The unsuspected role of stimulated emission in fluorescence dynamics*” (1999.)
6. Xiaomin Yang, “*Advanced RF IC Design for wireless communications*” 2001 (ECE).
7. Christian Kaiser, “*X-ray source for photolithography*” (2001)
8. Larry Shaw, “*Micromachining with femtosecond lasers*” (2001).
9. Javier Gonzalez, “*Antenna-coupled infrared focal plane arrays*” (Dissertation proposal 2002).
10. Will Burdett, “*Electron injection-induced effects in III-Nitrides : physics and applications,*” (2004).
11. Mark Nurge, “*Capacitance sensors*” (2007)
12. Mike Hogue, “*Insulator-insulator charging*” (2006)
13. Fatma Salman, “*Chemical bath deposition of TiO<sub>2</sub>*”
14. *Stopped keeping track.*

#### MS thesis committees

1. Asoka Pieris, “*Pressure dependence of Mossbauer shift for Fe-Ni alloy*” (1996).
2. Craig Perkins, “*Photo dissociation of polycyclic aromatic hydrocarbons above 9 eV.*”
3. Mark Nurge, “*Capacitance level meter*” (2003).
4. *Stopped keeping track.*

## **SERVICE**

### Physics Department Graduate coordinator 2000-2004

- Initiated a recruitment effort that monotonically increased graduate enrollments by a factor of 5 in three years.
- Increased in-state enrollments from 0% in 2000 to 71% in 2002.
- Increased average general GRE score of incoming class from <1100 to >1200.

### New Physical Sciences Building Committee Chairman 2004-2006

#### Other committee assignments

- Department Tenure and Promotion Committee
- Department Candidacy Exam Committee
- Search Committees
- Library Liaison
- Space Committee
- Shared Facilities Committee

#### Conference session chair

1. SPIE Photonics West, Terahertz spectroscopy and applications, "Direct Detectors of THz radiation," San Jose CA January 1998.
2. OSA Conference on Advanced Semiconductor Lasers and Their Applications, "Quantum Cascade and Interband IR Lasers," Santa Barbara CA July 1999.
3. Gordon Conference on Vibrational Spectroscopy, "THz spectroscopy," Newport RI, Aug 2000.

#### NSF panel reviews

- Electronics, waves, and beams, SBIR panel, May 1996.
- Electronics, waves, and beams, Equipment proposals, May 1998.
- Electronics, Photonics, and Device Technologies Program, Electrical and Communications Systems Division, CAREER proposals, Nov 1999.
- Optoelectronics & Photonics Panel, May 2000.

#### Reviewer of journal submissions

- Physical Review
- Physical Review Letters
- Journal of Applied Physics
- Applied Physics Letters
- Journal of Luminescence
- Applied Optics.
- IEEE J. Quantum Electronics
- Optics Express
- J. Quantitative Spectroscopy and Radiation Transfer

## RESEARCH FUNDING

<b>Title</b>	<b>Sponsor</b>	<b>Start</b>	<b>Amount</b>	<b>UCF number</b>
Crew Key Project	The Analytic Sciences Corp	1992	\$5,004	1168809
Fourier Spectrometer Enhancement for UV Operation	UCF	1993	\$4,500	1168921
Fourier-transform spectroscopy in Laser Crystals	AFOSR	1994	\$54,887	1168504
Time-resolved spectroscopy of energy transfer	UCF	1994	\$7,000	1168923
High resolution spectroscopy of hydrazine compounds from 1 to 20 mm	INET	1995	\$13,000	1168811
Novel Sub-millimeter semiconductor laser	UCF	1995	\$5,500	1168925
Schlieren optics for leak detection	NASA/ASEE SFFP	1995	\$12,000	N/A
Event-locked time-resolved Fourier Spectroscopy for ns dynamic processes	AFOSR	1996	\$51,123	1168505
Mode-locked, high power semiconductor FIR/sub-mm laser	NSF	1996	\$206,028	1168418
Fourier-transform spectrometer (loan became donation)	NASA-KSC	1996	\$87,640	ID:23953
Reflectance Modulation Spectroscopy	UCF	1996	\$7,500	1168930
Use of Bacteriorhodopsin as an adaptive spatial optical filter	NASA/ASEE SFFP	1996	\$12,000	N/A
Mode-locked semiconductor THz Laser	AFOSR/BMDO	1997	\$55,850	1168506
Spectroscopic studies of sulfur microwave discharges	Korea Electric Power Research Institute	1997	\$52,919	1168813
Insitu contamination monitor for SBIRS satellite	Aerojet	1998	\$32,419	1168818
Quantitative IR thermography	NASA/ASEE SFFP	1998	\$12,000	N/A
Contaminant-Carbonate Interactions	Pacific Northwest National Lab	1999	\$84,311	24088003
Sputter deposition of InAs thin films	F.W.Bell Inc./Solar Associates	1999	\$54,312	11688002
BiCMOS process integration	Cirent Tax Match Program	1999	\$22,712	1168820
Lucent Tax Exception	Agere Systems, Inc.	1999	\$9,371	2006805
Continuous Wave Semiconductor Laser at Terahertz Frequencies	NSF	2000	\$262,492	24086007; 1168029
Continuous Wave Semiconductor Laser at Terahertz Frequencies	UCF	2000	\$30,942	1168426
Tunable and Mode-locked p-Ge THz Laser	Zaubertek	2000	\$25,974	11688006

Widely Tunable and High Duty Terahertz p-Ge Laser in a Closed Cycle Refrigerator	AFOSR	2001	\$65,850	11686017
Gain, Power, and Duty Enhancement for the Far-infrared p-Ge laser by Neutron Transmutation Doping	Zaubertek	2001	\$21,735	11688007
Terahertz Devices: Tunable and Mode-locked p-Ge Terahertz Laser	Zaubertek	2002	\$191,250	11688011
Terahertz amplification in periodically doped multilayer p-GaAs/GaAs structures	AFRL	2005	\$9,986	24086035
Upgrade for Bomem DA8 Fourier spectrometer	Zaubertek	2005	\$16,612	24088032; 11684107; 24089907
Acetone Vapor Detection System	Lockheed Martin	2005	\$21,945	65018201
Si based THz laser	AFOSR/ASEE SFFP	2005	\$16,200	N/A
Scanning Fabry-Perot at millimeter and sub-millimeter wavelengths	Zyberwear	2005	\$1,600	24088029
Surface Plasmon polariton dependence on metal surface morphology	AFRL	2006	\$21,420	24086039
Scanning Fabry-Perot at millimeter and sub-millimeter wavelengths	Zyberwear	2006	\$16,138	24088046
Scanning Fabry-Perot at millimeter and sub-millimeter wavelengths	FHTC I-4	2006	\$7,269	20190736
Submillimeter Wave Solvent Spectroscopy	Lockheed Martin	2006	\$25,000	65018224
Submillimeter Wave Solvent Spectroscopy	FHTC I-4	2006	\$23,473	20194416
High Power Terahertz Laser	Zyberwear	2006	\$30,000	24088052
High power terahertz laser	FHTC I-4	2006	\$15,000	20190040
Surface plasmons	AFOSR/ASEE SFFP	2006	\$17,200	N/A
Investigation of Restrahlen Effect and Soil Characterization	Lockheed Martin	2006	\$15,000	65018246
Terahertz plasmon-induced conductance effects in semiconductor heterostructures	AFRL	2007	\$33,751	24086045
Millimeter-wave sensing of acetone and other vapors	Lockheed Martin	2007	\$20,000	24088064
Millimeter-wave sensing of acetone and other vapors	FHTC I-4	2007	\$10,000	20190113
Preparation and characterization of gold black thin films	Zyberwear	2007	\$15,120	24088063
Preparation and characterization of gold black thin films	FHTC I-4	2007	\$7,560	20190078



Grating coupled THz detectors	AFOSR/ASEE SFFP	2007	\$18,200	N/A
THz intracavity laser absorption spectrometer	Zyberwear	2008	\$20,990	20190158
THz intracavity laser absorption spectrometer	FHTC I-4	2008	\$6,638	24088096
Tunable wavelength-selective plasmonic terahertz detector	AFOSR	2008	\$59,806	24086061
Far infrared spectroscopy of mineral particles	NASA-JPL	2008	\$120,700	24088081
Two dimensional plasmons at surfaces and inversion layers	General Dynamics	2008	\$19,750	24088097
THz intracavity laser absorption spectrometer Option	Zyberwear	2009	\$14,885	24088111
Terahertz Intracavity Laser Absorption Spectrometer	Zyberwear	2009	\$204,111	24088114
Plasmonic-electronic transduction	AFOSR	2009	\$205,719	24086078
Plasmonic tunable terahertz detector	Zyberwear	2009	\$55,178	24088108
Plasmonic tunable terahertz detector	FHTC I-4	2009	\$17,209	20190185
Multi-layer far-infrared component technology	Zyberwear	2009	\$29,985	24088105
Multi-layer far-infrared component technology	FHTC I-4	2009	\$5,973	20190173
Submillimeter-wave Fabry-Perot spectrometer	FSGC	2009	\$24,996	24089014
Infrared Surface Plasmon Resonance Biosensor	Zyberwear	2010	\$43,125	24088115
Infrared Surface Plasmon Resonance Biosensor	FHTC I-4	2010	\$14,375	20090061
Metal-blacks for plasmonic enhancement of solar cell efficiency	LRC Engineering Inc	2010	\$49,613	24088116
Metal-blacks for plasmonic enhancement of solar cell efficiency	FHTC I-4	2010	\$16,538	20090062
Hyperdog: Planetary Sniffer	FSGC	2011	\$24,758	24089015
Planar integrated plasmonic mid-IR spectrometer	LRC Eng, Inc.	2011	\$49,613	24088126
Planar integrated plasmonic mid-IR spectrometer	FHTC I-4	2011	\$16,371	20090099
Microbolometer Technology	EMX Intl LLC	2011	\$187,596	24088130
Microbolometer Technology	FHTC I-4	2012	\$62,532	20090107
HypIR Microbolometer Technology Phase III	EMX Intl LLC	2012	\$238,138	24088135
Planetary Atmosphere Minor Species Sensor (PAMSS)	Florida Space Inst	2012	\$39,594	24089031
Graphene phototransistor tunable from ultraviolet to mm-waves	AFRL	2012	\$149,942	24086124
Delaying of microelectronic devices	Nanospective, Inc.	2013	\$15,327	24088142

Development of thin film spray deposition system	SISOM Thin films LLC	2013	\$5,995	24088138
Development of thin film spray deposition system	FHTC I-4	2013	\$5,995	20099119
Glass fabrication	Irradiance Glass Inc	2013	\$36,119	24088143
Glass fabrication and characterization	FHTC I-4	2013	\$36,119	20099121
TFT development	iCRco, Inc.	2013	\$8,611	24088141
Planetary Atmosphere Minor Species Sensor (PAMSS)	NASA (flight opportunity)	2013	\$1	no number
Delaying of microelectronic devices	FHTC I-4	2014	\$15,327	20099132
Cathode Development for Lithium Ion Battery	SISOM Thin films LLC	2014	\$5,000	24088147
Cathode Development for Lithium Ion Battery	FHTC I-4	2014	\$5,000	20099147
<b>Career total</b>			<b>\$3,541,422</b>	

### Publication summary

- 261 research publications and patents.
- 81 peer-reviewed articles since 1986.
- 172 conference publications.
- One invited book chapters
- 7 US patents.

### **REFEREED JOURNAL PUBLICATIONS by YEAR**

#### 1986

1. *"Incoherent saturation study of the selenium donor in AlSb,"* R. E. Peale, K. Muro, J. T. McWhirter and A. J. Sievers, Sol. State Comm. 60, 753 (1986).

#### 1987

2. *"Infrared spectral hole burning of sulfur-hydrogen deep donors in a Si:Ge crystal,"* S. P. Love, K. Muro, R. E. Peale and A. J. Sievers, Phys. Rev. B 36, 2950 (1987).

#### 1988

3. *"Zeeman splitting of double-donor spin-triplet levels in silicon,"* R. E. Peale, K. Muro, A. J. Sievers and F. S. Ham, Phys. Rev. B 37, 10829 (1988).

#### 1990

4. *"Infrared study of (H,Be)-, (D,Be)-, and (Li,Be)-acceptor complexes in silicon,"* R. E. Peale, K. Muro, and A. J. Sievers, Phys. Rev. B 41, 5881 (1990).

#### 1991

5. *"Magneto-optical properties of the DX center in Al<sub>0.35</sub>Ga<sub>0.65</sub>As:Te,"* R. E. Peale, Y. Mochizuki, H. -J. Sun, and G. D. Watkins, Semiconductor Science and Technology 6, B92 (1991).

6. "Passivation of shallow impurities in Si by annealing in  $H_2$  at high temperature," I. A. Veloarisoa, M. Stavola, D. M. Kozuch, R. E. Peale, and G. D. Watkins, *Appl. Phys. Lett.* 59, 2121 (1991).

#### 1992

7. "Optical detection of EPR and electron-nuclear double resonance for substitutional Mn(d5) in InP:Sn," H. J. Sun, R. E. Peale, and G. D. Watkins, *Phys. Rev. B* 45, 8310 (1992).
8. "Absence of dichroism for the DX optical-bleaching transients in  $Al_{0.35}Ga_{0.65}As:Te$ ," R. E. Peale, H. -J. Sun, and G. D. Watkins, *Phys. Rev. B* 15, 3353-9 (1992).
9. "Magnetic circular dichroism of the DX center in  $Al_{0.35}Ga_{0.65}As:Te$ ," R. E. Peale, Y. Mochizuki, H. -J. Sun, and G. D. Watkins, *Phys. Rev. B* 15, 5933-43(1992).

#### 1993

10. "Spectroscopy and Laser Performance of Nd Doped Gadolinium Lithium Fluoride," X. X. Zhang, Z. B. Villaverde, M. Bass, B. H. T. Chai, H. Weidner, R. I. Ramotar, and R. E. Peale, *J. Appl. Phys.* 74, 790 (1993).

#### 1994

11. "Interpretive crystal-field analysis: Application to  $Nd^{3+}$  in  $YVO_4$ , and in  $GdVO_4$ ," F. G. Anderson, P. L. Summers, H. Weidner, and R. E. Peale, *Phys. Rev. B* 50, 14802 (1994).
12. "Spectroscopy and crystal-field analysis for  $Nd^{3+}$  in  $GdLiF_4$ ," F. G. Anderson, H. Weidner, P. L. Summers, and R. E. Peale, *J. Luminescence* 62, 77 (1994).
13. "Effect of  $Gd^{3+}$  substitution for  $Y^{3+}$  in  $YLiF_4$ ,  $KLiYF_5$ , and  $YVO_4$ ," F. G. Anderson, H. Weidner, P. L. Summers, R. E. Peale, X. X. Zhang, and B. H. T. Chai, *J. Luminescence* 60&61, 150(1994).
14. "Temperature and Concentration Dependences of  $Ho^{3+}$  to  $Yb^{3+}$  Energy Transfer in  $Yb^{3+}$ ,  $Ho^{3+}$  Codoped  $KYF_4$ ," X. X. Zhang, P. Hong, M. Bass, R. E. Peale, H. Weidner, and B. H. T. Chai, *J. Luminescence* 60&61, 878(1994).
15. "Spectroscopy of  $Nd^{3+}$  in  $KLiYF_5$  and  $KLiGdF_5$ ," P. L. Summers, H. Weidner, R. E. Peale, and B. H. T. Chai, *J. Appl. Phys.* 75, 2184-2188 (1994).
16. "Site Selective Spectroscopy of  $Ho^{3+}:KYF_4$ ," R. E. Peale, H. Weidner, P. L. Summers, and B. H. T. Chai, *J. Appl. Phys.* 75, 502-505 (1994).

#### 1995

17. "Site selective spectroscopy and crystal field analysis of  $Nd^{3+}$  in strontium fluorovanadate," R. E. Peale, P. L. Summers, H. Weidner, and C. A. Morrison, *J. Appl. Phys.* 77, 270 (1995).
18. "Spectroscopic characteristics of  $Nd^{3+}$  doped strontium fluorovanadate and their relationship to laser performance," P. Hong, X. X. Zhang, R. E. Peale, H. Weidner, M. Bass, and B. H. T. Chai, *J. Appl. Phys.* 77, 294 (1995).

#### 1996

19. "Zebra schlieren optics for remote leak detection," R. E. Peale and P. L. Summers, *Applied Optics* 35, 4518 (1996).
20. "Time-resolved Fourier spectroscopy for activated optical materials," H. Weidner and R. E. Peale, *Applied Optics* 35, 2849 (1996).
21. "Time-Resolved Fourier Spectroscopy for Phosphor Characterization," H. Weidner, C. J. Schwindt, and R. E. Peale, *J. Soc. Information Display* 4/ 3, 177-181 (1996).
22. "Submillimeter p-Ge laser using a Voigt-configured permanent magnet," Kijun Park, R. E. Peale, H. Weidner, and J. J. Kim, *IEEE J. Quantum Electronics* 32, 1203-1210 (1996).

#### 1997

23. "Photoluminescence studies of thermally impurity diffused porous silicon layers," K. B. Sundaram, S. A. Ali, R. E. Peale, and W. A. McClintic, Jr., *J. Materials Science: Materials in Electronics* 8, 163-169 (1997).
24. "White light schlieren optics using bacteriorhodopsin as an adaptive image grid," R. E. Peale, A. B. Ruffin, and J. E. Donahue, *Applied Optics* 36, 4446 (1997).
25. "Event-locked time-resolved Fourier Spectroscopy," H. Weidner and R. E. Peale, *Applied spectroscopy* 51, 1106 (1997)
26. "Transient event-locked Fourier spectroscopy," H. Weidner and R. E. Peale, *J. Lumin.* 72-74, 1020 (1997).

#### 1998

27. "Laser Action in  $Yb^{3+}:YCOB$  ( $Yb^{3+}:YCa_4O(BO_3)_3$ )," D. A. Hammons, J. M. Eichenholz, Q. Ye, B. H. T. Chai, L. Shah, R.E. Peale, M. Richardson, and H. Qiu, *Optics Communications* 156, 327-330 (1998).
28. "Quality Analysis for Least-Squares Transformation of Unevenly Spaced Interferograms," H. Weidner and R. E. Peale, *Applied spectroscopy* 52, 587 (1998).
29. "Evidence for self-mode-locking in p-Ge laser emission," A. V. Muravjov, R. C. Strijbos, C. J. Fredricksen, H. Weidner, W. Trimble, S. H. Withers, S. G. Pavlov, V. N. Shastin, and R. E. Peale, *Appl. Phys. Lett.* 73, 3037 (1998).

#### 1999

30. "Diode-pumped self-frequency doubling in a  $Nd^{3+}:YCa_4O(BO_3)_3$  laser," J. M. Eichenholz, D. A. Hammons, L. Shah, Q. Ye, R. E. Peale, M. Richardson, and B. H. T. Chai, *Applied Physics Letters* 74, 1954-1956 (1999)
31. "Laser tunability in  $Yb^{3+}:YCa_4O(BO_3)_3$  ( $Yb:YCOB$ )," L. Shah, Q. Ye, JM Eichenholz, DA Hammons, M Richardson, BHT Chai, RE Peale RE, *Opt. Commun.* 167, 149 (1999).
32. "Pulse separation control for mode-locked far-infrared p-Ge lasers," A. V. Muravjov, R. C. Strijbos, C. J. Fredricksen, S. H. Withers, W. Trimble, S. G. Pavlov, V. N. Shastin, and R. E. Peale, *Appl. Phys. Lett.* 74, 167-169 (1999).

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128. "*High Temperature Line Lists For Carbon Monoxide From Microwave Discharge Spectroscopy*," Farnood Rezaie, C. Ghosh, P. Figueiredo, J. Arnold, R. E. Peale, R. American Astronomical Society, AAS Meeting #218, #134.09; Bulletin of the American Astronomical Society, Vol. 43, 2011
129. "*Plasmonic enhancement of thin-film solar cells using gold-black coatings*," C.J. Fredricksen, D. R. Panjwani, J. P. Arnold, P. N. Figueiredo, F. K. Rezaie, J. Colwell, K. Baille, S. J. Peppernick, K. M. Beck, A. G. Joly, R. E. Peale, Proc. SPIE 8111 - 6 V. 2 (2011).
130. "*InP- and graphene-based grating-gated transistors for tunable THz and mm-wave detection*," R. E. Peale, Nima Nader Esfahani, Christopher J. Fredricksen, Gautam Medhi, Justin W. Cleary, Walter R. Buchwald, Himanshu Saxena ,

- Oliver J. Edwards, Ben D. Dawson, and M. Ishigami, Proc. SPIE 8164 – 7 (2011).
131. “*Planar integrated plasmonic mid-IR spectrometer*,” P. Figueiredo, J. Nath, G. Medhi, A. Muraviev, C. J. Fredricksen, W. R. Buchwald, J. W. Cleary, R. E. Peale, Proc. SPIE 8155A – 2 (2011), **Invited**.
  132. “*Infrared Intracavity Laser Absorption Spectrometer for Trace Gas Sensing*,” Robert E. Peale, Nasa Tech Briefs Sensors Tech Forum, Oct 10-12, 2011, Boston, MA **Invited**.
  133. “*Cathodoluminescence spectroscopy on lamellar metal and semiconductor gratings for nano-photonics devices*,” J. Nath, C. Schwarz, E. Smith, Chandana Ghosh, R. E. Peale, L. Chernyak, W. R. Buchwald, Proc. Intl. Conf. Advances in Materials and Materials Processing (ICAMMP-2011) Indian Institute of Technology, Kharagpur, 9-11 December, 2011.
  134. “*Study of ‘gold black’ coating as potential thin film solar cell efficiency enhancer*,” Deep Panjwani, Christopher J. Fredricksen, Samuel J. Peppernick, Alan G. Joly, Kenneth M. Beck, Yauheni Rudzevich. Robert E. Peale, Proc. Intl. Conf. Advances in Materials and Materials Processing (ICAMMP-2011) Indian Institute of Technology, Kharagpur, 9-11 December, 2011.

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135. “*Sensitivity of long-wave infrared intracavity laser absorption vapor detector*,” Gautam Medhi, Chris J. Fredricksen, Robert E. Peale, Andrey V. Muravjov, Oliver J. Edwards, Proc. SPIE 8236 – 55 (2012), Photonics West, Jan 2012, San Francisco CA.
136. “*Plasmon absorption in grating-coupled InP HEMT and graphene sheet for tunable THz detection*,” Nima Nader Esfahani, R. E. Peale, Christopher J. Fredricksen, Justin W. Cleary, Joshua Hendrickson, Walter R. Buchwald, Ben D. Dawson, and M. Ishigami, Proc. SPIE 8261 - 14 (2012)
137. “*Laboratory far-IR Spectroscopy of Phyllosilicates*,” M. Yesiltas, T. Brusentsova, R. E. Peale, D. Maukonen, P. Figueiredo, G. E. Harlow, D. S. Ebel, A. Nissinboim, K. Sherman, C. M. Lisse, 219th AAS meeting in Austin, TX January 12-13, 2012.
138. “*Planar integrated plasmonic mid-IR spectrometer*,” Christopher J. Fredricksen, Justin W. Cleary, Walter R. Buchwald, Pedro Figueiredo, Farnood Khalilzadeh-Rezaie, Gautam Medhi, Imen Rezadad, Monas Shahzad, Mehmet Yesiltas, Janardan Nath, Javaneh Boroumand, and Robert E. Peale, Proc. SPIE 8353 – 63 (2012).
139. “*Cathodoluminescence of conducting gratings and implications for electron-beam investigations of nano-photonics devices*,” Janardan Nath, Casey Schwarz, Evan Smith, Chandana Ghosh, R. E. Peale, L. Chernyak, Walter R. Buchwald, Proc. SPIE 8376 – 18 (2012).
140. “*Infrared surface plasmon polariton on polyaniline-graphite composite*,” Monas Shahzad, Gautam Medhi, Doug Maukonen, Mehmet Yesiltas, R. E. Peale, Walter R. Buchwald, Justin Cleary, Yi Liao, Candace Alber, Valentine K. Johns, Rahul Hegishte, Glen D. Boreman, Proc. SPIE 8366 – 3 (2012).

141. *"InP- and Graphene-based grating-gated transistors for tunable THz and mm-wave detection,"* Nima Nader Esfahani, Justin W. Cleary, Robert E. Peale, Walter R. Buchwald, Christopher J. Fredricksen, Joshua Hendrickson, Michael S. Lodge, Ben D. Dawson, and M. Ishigami, Proc. SPIE 8373 – 80 (2012).
142. *"First observation of a plasmon-mediated tunable photoresponse in a grating-gated InGaAs/InP HEMT for millimeter-wave detection,"* Nima Nader Esfahani, Robert E. Peale, Walter R. Buchwald, Joshua R. Hendrickson, and Justin W. Cleary, Proc. SPIE 8512-33 (2012), 7 pages.
143. *"Planar integrated plasmonic mid-IR sensor,"* Farnood K. Rezaiea, Chris J. Fredericksen, Walter R. Buchwalda, Justin W. Clearya, Evan M. Smith, Imen Rezadad, Janardan Nath, Pedro Figueiredo, Monas Shahzad, Javaneh Boroumand, Mehmet Yesiltas, Gautam Medhi, Andrew Davis and Robert E. Peale, 2012 MRS Proc. 1510, Paper number 1443159 (2013), **refereed**, 6 pages.

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144. *"Release of MEMS devices with hard-baked polyimide sacrificial layer,"* Javaneh Boroumand Azad, Imen Rezadad, Janardan Nath, Evan Smith, Robert E. Peale, Proc. SPIE 8682 – 80 (2013), 6 pages.
145. *"Millimeter and terahertz detectors based on plasmon excitation in InGaAs/InP HEMT devices,"* Nima Nader Esfahani, Robert E. Peale, Walter R. Buchwald, Joshua R. Hendrickson and Justin W. Cleary, Proc. SPIE 8624 – 25 (2013), 8 pages.
146. *"In situ investigation of meteoritic organic–mineral relationships by high spatial resolution infrared spectroscopy,"* M. Yesiltas, C. J. Hirschmugl, R. E. Peale 76<sup>th</sup> Met Soc 2013, METEORITICS & PLANETARY SCIENCE 48:SI Supplement 1, A384-A384JUL 2013
147. *"Stress Analysis of Free-standing Silicon Oxide Films Using Optical Interference,"* Imen Rezadad, Javaneh Boroumand, Evan Smith, Pedro Figueiredo, Robert Peale, MRS Proc. Spring Meeting MRSS13-1536-A17-11 (2013), 6 pages, **referreed**.
148. *"Stress analysis of free-standing silicon oxide films using optical interference,"* Imen Rezadad, Javaneh Boroumand, Evan Smith, Pedro Figueiredo, Robert E. Peale, Florida AVS, Orlando 2013 (poster).
149. *"Performance measurement of a commercial PbSe photoconductor,"* Evan Smith, Robert Peale, Imen Rezadad, Oliver Edwards, Florida AVS, Orlando 2013 (poster, **honorable mention winner**).
150. *"Patterning of oxide-hardened goldblack by standard photolithography,"* Deep Panjwani, Mehmet Yesiltas, Dan Franklin, Doug Maukonen, Evan Smith, Janardan Nath, R. E. Peale, Julia Sedlemair, Ralf Wehlitz, Florida AVS, Orlando 2013 (poster, **first prize winner**)
151. *"Planar integrated plasmonic MID-IR spectrometer,"* Farnood K. Rezaie, Christopher J. Fredricksen, Walter Buchwald, Justin Cleary, Andrew Davis, Imen Rezadad, Evan Smith, and Robert E. Peale, Florida AVS, Orlando 2013 (poster, **honorable mention winner**).
152. *"Thin-film, wide-angle, design-tunable selective absorber from near UV to far-infrared,"* Janardan Nath, Douglas Maukonen, Evan Smith, Pedro Figueiredo, Guy Zummo, Deep Panjwani, Robert E. Peale, Glenn Boreman,

- Justin W. Cleary, Kurt Eyink, Florida AVS, Orlando 2013 (poster, **second prize winner**).
153. “*Infrared intracavity laser absorption spectrometer for trace gas sensing*,” R. E. Peale, Andrei Muraviev, Doug Maukonen, Chris Fredricksen, Gautam Medhi, American Chemical Society Florida Section (FAME) 89<sup>th</sup> annual meeting, Palm Harbor FL, May 2013, **invited presentation**.
  154. “*Microspectroscopy of Meteorites: Search for Organic – Mineral Correlations*,” M. Yesiltas, M. Unger, J. Sedlmair, C. J. Hirschmugl, T. N. Brusentsova, J. Arnold, R. E. Peale, From Stars to Life, University of Florida, Gainesville April 2013 (poster).
  155. “*Microspectroscopy of Meteorites: Search for Organic – Mineral Correlations*,” M. Yesiltas, M. Unger, J. Sedlmair, C. J. Hirschmugl, T. N. Brusentsova, J. Arnold, R. E. Peale, 44th Lunar and Planetary Science Conference (2013), Abstract #2717, 2 pages.
  156. “*Thin-film, wide-angle, design-tunable, selective absorber from near UV to far infrared*,” Janardan Nath, Douglas Maukonen, Evan Smith, Pedro Figueiredo, Guy Zummo, Deep Panjwani, Robert E. Peale, Glenn Boreman, Justin W. Cleary, Kurt Eyink, Proc. SPIE 8704 – 127 (2013), 7 pages.
  157. “*MEMS clocking-cantilever thermal detector*,” Evan Smith, Javaneh Boroumand, Imen Rezaadad, Pedro Figueiredo, Janardan Nath, Deep Panjwani, R. E. Peale, Oliver Edwards, Proc. SPIE 8704 – 100 (2013), 4 pages.
  158. “*Quantum Cascade Laser Intracavity Absorption Sensor*,” Andrei Muraviev, Doug Maukonen, Chris Fredricksen, Gautam Medhi, R. E. Peale, Proc. SPIE 8710-27 (2013), 6 pages.
  159. “*Patterning and hardening of Gold Black infrared absorber by shadow mask deposition with Ethyl Cyanoacrylate*,” Deep Panjwani, Nima Nader-Esfahani, Doug Maukonen, Imen Rezaadad, Javaneh Boroumand, Evan Smith, Janardan Nath, R.E. Peale, Proc. SPIE 8708-41 (2013), 8 pages.
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160. “Tunable excitation of two-dimensional plasmon modes in InGaAs/InP, HEMT devices for terahertz detection, Nima Nader Esfahani, Xin Qiao, Robert E. Peale, Walter R. Buchwald, Joshua R. Hendrickson and Justin W. Cleary, Proc. SPIE 8993 – 14 (2014).
  161. “SYNCHROTRON-BASED FTIR MICROSPECTROSCOPY AND MICRO-RAMAN SPECTROSCOPY OF SUTTER’S MILL METEORITE,” M. Yesiltas, Y. Kebukawa, E. Mattson, C. J. Hirschmugl, R. E. Peale, 45th Lunar and Planetary Science Conference, Extended Abstract #1396 (2014).
  162. “Room Temperature aging in nano-crystalline porous gold coatings,” Deep Panjwani, Aniruddha Dutta, Janardan Nath, Helge Heinrich, Robert Peale 2014 FIAVS/FSM Joint Symposium (2014) Orlando FL.
  163. “MEMS cantilever with electrostatically-controlled tip contact,” Imen Rezaadad, Javaneh Boroumand, Evan Smith, Robert E. Peale, FIAVS/FSM Joint Symposium (2014) Orlando FL.
  164. “Metal-insulator-metal waveguide metamaterial absorber: Theory and experiment,” Janardan Nath, Imen Rezaadad, Deep Panjwani, Robert E. Peale,



- Sushrut Modak, Debashis Chanda, Carol Hirschmugl, 2014 FLAVS/FSM Joint Symposium (2014) Orlando FL.
165. *"Thin-film ferroelectric oxides for photovoltaic energy production,"* Farnood K. Rezaie, Deep Panjwani, Doug Maukonen, Isaiah O. Oladeji, and Robert E. Peale, FLAVS/FSM Joint Symposium (2014) Orlando FL.
  166. *"Linear bolometer array using a high TCR VOx-Au film,"* Evan M. Smith, James C. Ginn, Andrew P. Warren, Christopher J. Long, Deep Panjwani, Robert E. Peale, David J. Shelton, Proc. SPIE 9070 – 120 (2014), 8 pages.
  167. *"Planetary Atmospheres Minor Species Sensor (PAMSS),"* Doug Maukonen, Chris J. Fredricksen, Andrei V. Muraviev, Ammar Alhasan, Seth Calhoun, Guy Zummo, Robert E. Peale, Joshua E. Colwell, Proc. SPIE 9113 – 25 (2014), 8 pages.
  168. *"Vertical electrostatic force in MEMS cantilever IR sensor,"* Imen Rezaadad, Javaneh Boroumand, Evan M. Smith, Ammar Alhasan, Robert E. Peale Proc. SPIE 9070 – 57 (2014), 8 pages.
  169. *"Thermomechanical Characterization in a Radiant Energy Imager Using Null Switching,"* Javaneh Boroumand, Imen Rezaadad, Ammar Alhasan, Evan Smith, R. E. Peale, Proc. SPIE 9070 - 125 (2014), 5 pages.
  170. *"Wavelength-selective visible-light detector based on integrated graphene transistor and surface plasmon coupler,"* Christian W. Smith, Doug Maukonen, R. E. Peale, C. J. Fredricksen, M. Ishigami, and J. W. Cleary, 9083 – 102 (2014), 7 pages.
  171. *"Chalcogenide glass thin-film optics for infrared applications,"* Janardan Nath, Deep Panjwani, R. E. Peale, J. David Musgraves, Pete Wachtel, and Jennifer McKinley, Proc. SPIE 9085 – 7 (2014), 7 pages.
  172. *"Junctionless thin-film ferroelectric oxides for photovoltaic energy production,"* Farnood K. Rezaie, Deep Panjwani, Janrdan Nath, Christopher. J. Fredricksen, Isaiah O. Oladeji, Robert E. Peale, Proc. SPIE 9115 – 27 (2014), 7 pages.

#### Patents

1. *"Bulk Semiconductor Lasers at Submillimeter/ Far Infrared Wavelengths using a Regular Permanent Magnet,"* J. J. Kim, R. E. Peale, and K. Park, United States Patent number 5,784,397, Jul. 21, 1998
2. *"Method of time-resolving Fourier-transform spectroscopy to allow interferogram sampling at unevenly spaced path-length differences,"* H. Weidner and R. E. Peale, U. S. Patent 5,838,438, November 17, 1998.
3. *"Analog pulse position modulation in harmonically mode-locked lasers,"* R. E. Peale, A. V. Muravjov, R. C. Strijbos, C. J. Fredricksen, and S. H. Withers, U.S. Patent 6,580,733 (2003).
4. *"Method of hardening and patterning metal-black infrared absorbing films,"* Deep Panjwani, provisional application Application #: 61/837,868, application date 6/21/13.
5. *"Beam-shaping phase control for coupled ring-cavity surface-emitting quantum cascade laser,"* R. E. Peale, A. V. Muraviev, and P. Figueiredo, R. E. Peale, Pedro Figueiredo, Andrei Muraviev, New U.S. Utility Application Serial No.

- 14/295,941, filed June 4, 2014, based on Provisional Application Serial No. 61/831,268, filed June 5, 2013.
6. "*Dynamic alignment method for Quantum Cascade laser (QCL) based systems using feedback from QCL impedance,*" A. V. Muraviev, D. Maukonen, C. J. Fredricksen, and R. E. Peale, Provisional Patent Application Number 61/876,308 (17 April 2013).
  7. "*Graphene photo-transistor,*" R. E. Peale, M. Ishigami, C. W. Smith Provisional Patent Application Number 61/892,718 (18 October 2013).

#### Invited presentations

1. "*Energy transfer in laser crystals,*" University of Vermont, Burlington, Dec 1993.
2. "*Energy transfer in laser crystals,*" Utah State University, Logan, Feb 1994
3. "*The p-Ge laser: Physics of tunable emission near 100 microns,*" University of South Florida, Nov 1994.
4. "*New Techniques for studying energy-transfer phenomena in solids,*" Case Western Reserve University, Oct 1994.
5. "*Time-resolved Fourier-transform spectroscopy of impurities in fluoride crystals,*" Pacific Northwest National Lab Environmental Molecular Sciences Lab, May 1997
6. "*Mode-locked p-Ge lasers,*" Workshop on Semiconductor Infrared Detectors and Emitters, July 1997, Institute for Microstructural Sciences, National Research Council, Ottawa, Canada
7. "*Time-resolved Fourier transform spectroscopy,*" Chemistry Department Colloquium, Texas A&M University, Oct 1997
8. "*Mode-locked p-Ge laser,*" China Lake Naval Weapons Research Center, Dec 1997.
9. "*Faraday-configured mode-locked p-Ge laser and p-Ge far-infrared amplifier,*" OSA Advanced Semiconductor Lasers and their Applications, Santa Barbara, July 1999.
10. "*Event-locked method of gated and time-resolved Fourier spectroscopy,*" OSA Fourier Transform Spectroscopy: New Methods and Applications, Santa Barbara, June 1999.
11. "*Far-infrared p-Ge laser and proposals for p-Ge films,*" NRC Canada, Dec 2000.
12. "*The far-infrared p-Ge laser,*" Florida Memorial College Nov 2000.
13. "*The far-infrared p-Ge laser,*" Bethune Cookman College Nov 2000.
14. "*Broad distribution of crystal field environments for Nd<sup>3+</sup> in Calcite,*" Eckerd College, Nov 2001.
15. "*Ions, minerals, and Nuclear Waste,*" Florida Institute of Technology, 29 March 2002.
16. "*Semiconductor intervalence band THz lasers,*" University of North Florida, 11 February 2005.
17. "*Toward Si THz laser,*" University of South Florida, 9 September 2005.
18. "*Toward Si THz laser,*" Embry-Riddle Aeronautical University, 28 September 2005

19. "Delta-doped p-GaAs laser", AFRL Hanscom AFB, Lexington MA, June 9, 2006.
20. "*Far-infrared semiconductor lasers*," Florida Institute of Technology, 12 Jan 2007.
21. "*Plasmonic-electronic transduction*" U Mass Boston Physics Department Seminar, 5 March 2008.
22. "*Grating-gate tunable plasmon absorption in InP and GaN based HEMTs*," SPIE Nanophotonics and Macrophotonics for Space Environments III, San Diego CA August 2009
23. "*Multi-layer far-infrared component technology*," SPIE Photonics San Diego August 2010.
24. "*Anecdotes of THz science and technology*," NSF THz Workshop, Arlington VA 13 April 2011.
25. "*Electronic-Plasmonic Transduction*," AFOSR 2011 Joint Electronics Program Review, 23-26 May 2011 Arlington VA.
26. "*Planar integrated plasmonic mid-IR spectrometer*," SPIE Optics and Photonics, San Diego CA August 2011.
27. "*Infrared Intracavity Laser Absorption Spectrometer for Trace Gas Sensing*," NASA Tech Briefs Sensors Tech Forum, Oct 10-12, 2011, Boston, MA.
28. "*Infrared intracavity laser absorption spectrometer for trace gas sensing*," R. E. Peale, Andrei Muraviev, Doug Maukonen, Chris Fredricksen, Gautam Medhi, American Chemical Society Florida Section (FAME) 89th annual meeting, Palm Harbor FL, May 2013.
29. "*Planetary Atmospheres Minor Species Sensor*," R. E. Peale, Florida Space Institute Seminar October 30, 2013.