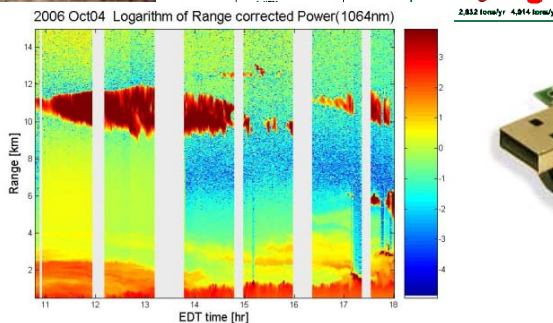
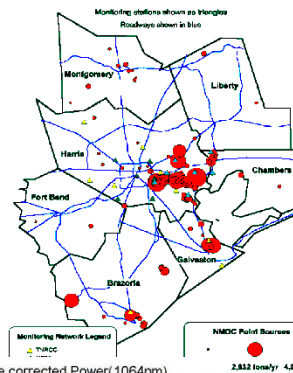


Engineering Research Center for Mid-InfraRed Technologies for Health and the Environment

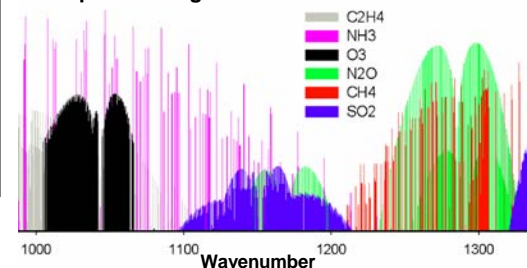
Sensing the world around us with ubiquitous and affordable technology for a better quality of life.



Claire F. Gmachl, Princeton Univ., Director
Anthony M. Johnson, UMBC, Deputy Director
James A. Smith, Princeton Univ., Deputy Director
Joseph X. Montemarano, Princeton Univ., Executive Director
www.mirthecenter.org



Absorption strength



Cooperative Agreement EEC-0540832



Current MIRTHE industry members & practitioners

Partners: **Consensus Business Group** **CORNING** **DAYLIGHT SOLUTIONS** **MAXION TECHNOLOGIES, INC.**

General Members: **AdTechoptics** **AERODYNE RESEARCH** **ALPES LASERS** **Agilent Technologies**
LI-COR Biosciences **HAMAMATSU** **DOLCE Technologies** **ExxonMobil**

Air Liquide **Tektronix** **ESI PHYSICAL SCIENCES INC.** **FAC** **ELI Epitaxial Laboratory** **SIEMENS**

Affiliates: **Innovative Photonics** **Boston Electronics** **DURASENS** **IRFlex** **primis TECHNOLOGIES LLC**
LaserMax **SightLogix** **Ekipis** **GHO VENTURES** **ILX Lightwave Laser Diode Instrumentation & Test Systems**

Media Affiliates: **LaserFocusWorld** **PHOTONICS MEDIA**

Non-profit/Gov: **Advanced Chemical Biological Center** **NEW JERSEY SBDC SMALL BUSINESS DEVELOPMENT CENTER** **New Jersey Commission on Science & Technology** **Sandia National Laboratories** **AMERICAN RESEARCH LABORATORY**
Science & Technology Facilities Council Rutherford Appleton Laboratory **Pacific Northwest NATIONAL LABORATORY** **Space Dynamics LABORATORY Utah State University Research Foundation**

Large Industry: 7
Venture Capital: 2
Total Members: 38

Small business: 19
including 1 home grown
start-up/more to come

Non-Profit: 8
Media: 2



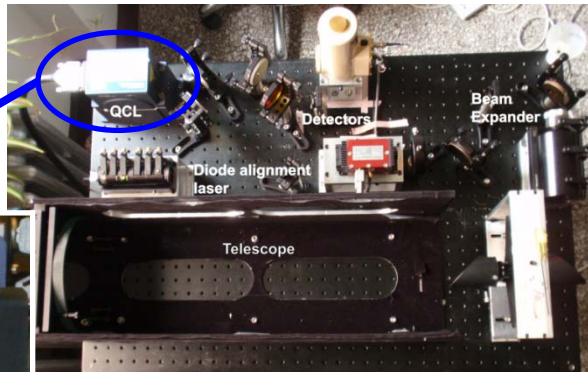
Industry involvement highlight: Daylight Solutions/Beijing

Deployment of remote sensor system at 2008 Beijing Olympics

- Unique environmental engineering study (impact of factory shut-downs, traffic control, etc. on air quality)
- Unique teaching opportunity (participating in significant events)
- Unique engineering study (field-test sensors in high impact environment)



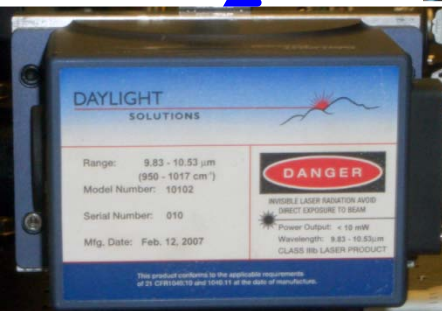
QCLOPS remote sensor:



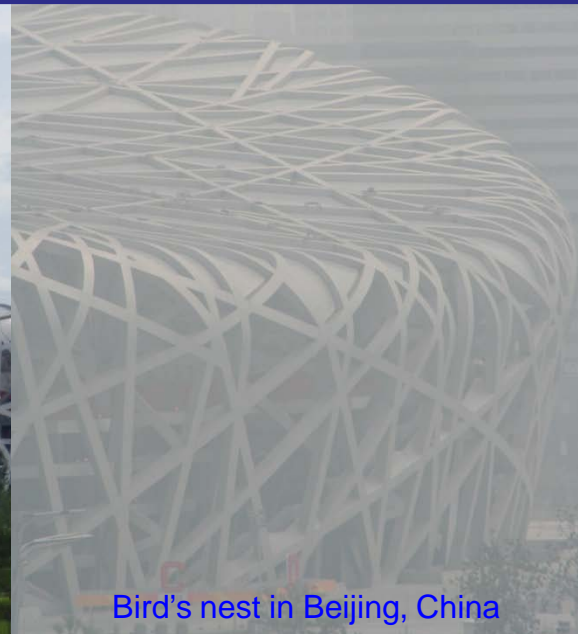
Remote sensing system “QCLOPS” was built with assistance of MIRTHE Industry Partner [Daylight Solutions Inc.](#)

- program start to deployment: ~ 9 month
- operated on site ~ 3 months near autonomously

Widely tunable QC laser:
Developed & provided by
Daylight Solutions, Inc.



Widely tunable laser system for:
ozone, ammonia, CO₂,
water vapor.



Bird's nest in Beijing, China



ERC Infrastructure to support start-ups

- Co-hosting of regional SBIR workshops; and co-organization of MIRTHE related conferences with industry presence and applications focus
- Flexible membership structure including no-cost option
- Venture Capital Investment Focus Group
 - Serve as sounding board for “wantabe entrepreneurs”
 - Refine mid-IR technologies and applications roadmap
 - Challenge/validate market assumptions & opportunities
 - Strengthen the entrepreneurial aspects of MIRTHE’s industry/practitioner program
- Access to MIRTHE and MIRTHE-related multi-user facilities and limited office space
- Informal agreement with nearby (10 minute drive) private science park/incubator for below-market flexible office and lab space from 50 to 15,000 square feet



MIRTHE Mid-IR Investment Focus Group

Mission: Educate venture capital, angel and other investment professionals related to mid-infrared technologies and applications opportunities

- A network of venture and angel investors seeking opportunities from MIRTHE mid-infrared technologies and applications
- Provides introductions to promising start-ups, established technology businesses, and large end-user members
- Serves as a window and allows input into development of MIRTHE's Mid-IR technologies and applications roadmap
- Joint assessment of technology readiness and approaches to commercialization

NOT an investment fund, but could serve as a spring-board



Challenges for start-ups @ MIRTHE

- Start-ups typically lack cash and choose “no-IP” member option
- Paying MIRTHE members have option for non-exclusive rights on MIRTHE supported inventions, which may restrict opportunities for start-ups to obtain exclusive licenses even if narrowly defined
- Limited or no risk-tolerant venture capital
 - Angel networks are forming to address the vacuum
 - Current market conditions are pretty flat
 - Exclusive licenses are often a deciding factor
- Royalty and equity-sharing pre-date Centers and Institutes – do not flow past departments
- MIRTHE and other Gen-2 (and even some Gen-3) Centers have “gaps” with respect to special needs of start-ups



Summary of informal poll of ERCs

- * Small Business = 500 employees or less
- ** Members have right of first refusal
- *** Under consideration at some centers

	Gen-1/2	Gen-3
	Y/N	Y/N
Membership Agreement Terms include:		
• Small Business Discount/Lower Member Fees*	4/1	3/0
• IP Rights/Options for Member Firms	5/0	3/0
• Buy-in Rights to Previously Developed IP	0/5	0/3
• IP may be licensed to Non-Members**	5/0	3/0
Center Structure:		
• IP Royalty and/or Equity flows to Center***	2/3	0/3
• Center has Policy on “Home-Grown” Start-ups	1/4	2/1
• Center has Launched 1 or more Start-ups	4/1	1/2
• Start-up/Entrepreneurship Infrastructure	2/3	2/1
Total # of Centers Responding (8):	5	3