

ESA Newsletter

Electrostatics Society of America - The Friendly Society

President's Message

I discussed our society growth and activities in the July – October 2018 newsletter; asking for suggestions from our members on sustaining current membership, attracting young people, developing activities to keep the current and future generations interested in our society activities, etc. It is not greediness that drives me to focus on our society's membership; rather it is my desire to put my best effort into our society's health and growth. We have been regularly hosting joint electrostatic conferences with three other societies. For the 2020 meeting in fact, marking our 50th year, we will be inviting the Chinese Electrostatic Society (CES) to also co-host the conference. Thanks to Kaz Adamiak for introducing the ESA to the CES's executives. As we celebrate our success, expanding our interactions with other groups that have common interests is timely and healthy.

Looking to the 2019 Electrostatics conference, organized by the Dielectrics & Electrostatics Group of the Institute of Physics (IOP), two conferences are co-located in Manchester this year. On Thursday, April 11th, 2019, the final session of Electrostatics 2019 and the first session of Dielectrics 2019 will be held in Joint Sessions with papers relevant to both subject areas. I personally feel this is a great move. In fact, a few of us have long had a similar vision to invite the IEEE Dielectrics and Electrical Insulation Society (DEIS) to join us.

In reality we are not a small community. As we all know, the study of electrostatics is widespread and its applications are vast. We can find a large number of different conferences in the field of electrostatics. Some examples include: 1) the International Conference on Lightning and Static Electricity held once every two or three years, 2) the regularly held electrostatic discharge (ESD) meetings under the IEEE Electron Devices Society (EDS), 3) conferences organized by DECHEMA in Frankfurt on behalf of the European Working Party 'Static Electricity in Industry' and 4) the Protein Electrostatics conference held once every two years since 2014. Of course, the Institute of Electrostatic Japan (IEJ), the IEEE Industry Applications Society (IAS) Electrostatic Processes Committee (EPC), and La Société Française d'Électrostatique (SFE) all have their own annual meetings in the years we do not co-host our joint conferences. What I am trying to encourage is to take advantage and/or create opportunities to extend our interactions with the IOP, DEIS, EDS, and other societies that share a common interest in the field of electrostatics, providing new options for collaboration and exploration.

For now, let me focus on our ESA Annual meeting, June 10-12, 2019 at Rochester Riverside Hotel, Rochester, NY, USA. The abstract submission date has been extended to March 18th 2019. The conference organizers are putting their best efforts to make the conference a success and your participation is most important. Please submit your abstracts at your earliest before the new deadline, if you have not yet submitted. It will help the organizers to plan the technical sessions and other activities. Thank you if you have already submitted your abstract(s).

Our annual meetings provide a unique interdisciplinary forum for discussion about electrostatic phenomena and their applications. This meeting will bring together experts across a diverse field, including the keynote speakers Dr. Steven Barrett, Dr. David Dean and Dr. Sarathi. Details on the Keynote Talks can be found elsewhere in this newsletter.

For the Friendly Society
 Shesha Jayaram, shesha.jayaram@uwaterloo.ca
 President, Electrostatics Society of America

Calendar

- ✦ Electrostatics 2019, April 8-11, 2019, and Dielectrics 2019, April 11-12, 2019, Manchester Conf. Hall, Manchester, UK, <http://electrostatics2019.iopconfs.org/home> & <http://dielectrics2019.iopconfs.org/home>
- ✦ 2019 ESA Annual Meeting, June 10-12, 2019, Rochester Riverside Hotel, Rochester, NY, USA, Contact: Kelly Robinson, kelly.robinson@electrostaticanswers.com, <http://www.electrostatics.org/annualmeeting.html>
- ✦ EIC 2019, Elec Insul Conf, June 16-19, 2019, Hyatt Regency Calgary, Calgary, Alberta, Canada, Further info: <http://ieee-eic.org>
- ✦ ICDL 2019, IEEE Int'l. Conf. on Dielectric Liquids, June 23-27, 2019, Univ. of Roma, Rome, Italy, Contact: Massimo Pompili or Luigi Calcara, icdl2019@uniroma1.it, <https://www.icdl2019.org>
- ✦ 4th ISNPEDADM 2019, Oct. 7-10, 2019, Bonifacio, Corsica Island, France. Contact: Eric Moreau, eric.moreau@univ-poitiers.fr

ESA Officers

President:

Shesha Jayaram, Univ. of Waterloo

Vice President and Awards Chair:

Maciej Noras, Univ. of North Carolina

Executive Council:

David Go, Univ. of Notre Dame

Poupak Mehrani, Univ. of Ottawa

Rajeswari Sundararajan, Purdue Univ.

Election of ESA Council Members

The ESA Bylaws provide for the election of officers every two years. Members vote for a complete slate of candidates at the annual meeting, and anyone is eligible to nominate or be part of a slate.

At this time, we have one nominated slate of candidates for this years election:

Slate of ESA Officers for 2019-2021

President

David Go, Univ. of Notre Dame

Vice President

Maciej Noras, Univ. of North Carolina

Executive Council

Shesha Jayaram, Univ. of Waterloo

N.K. Kishore, Indian Inst. of Tech., Kharagpur

Poupak Mehrani, Univ. of Ottawa

If anyone would like to nominate an alternate slate, please inform me well before the June conference so that we can prepare election materials for the business meeting.

Absent an alternate slate, we will likely approve the current nominated slate by acclamation.

Shesha Jayaram, ESA President
shesha.jayaram@uwaterloo.ca

ESA Elections By-Laws - New Council Slates Are Sought

Based on Article 4 of the ESA Constitution, the term of the present ESA Council ends on June 30, 2019 and the new Council term of office begins on July 1, 2019. It is now time for the Secretary (address found on back page of this ESA Newsletter) to receive slates of nominees for the upcoming (7/1/19 - 6/30/21) term.

Since the Council shall be nominated as a full slate, the presenter of that slate is responsible for checking with all the members of that slate to insure each nominee is willing to serve. A slate consists of five members: the President, the Vice-President and three Council Members.

If more than one slate is presented to the Secretary, a ballot will be mailed out about May 15 (or as soon as reasonably possible) with the deadline for receipt of the ballots by the Secretary being June 2, 2019. If only one slate is presented (then as tradition has held) no ballots will be mailed, and the Membership present at the ESA Annual Meeting will be asked to vote on the slate. If no slates are presented, then, as Article 4b states, "If extraordinary circumstances prevent the election of a new Council, the existing Council shall continue in office, year by year, until an election can be held."



2019 Annual Meeting of the Electrostatics Society of America

[Rochester Riverside Hotel, Rochester, NY](#)

June 10-12, 2019

The [Electrostatics Society of America](#) (ESA) invites papers in all scientific and technical areas involving electrostatics for the 2019 Annual Meeting of the ESA. Contributions range from fundamental physics and new developments in electrostatics to applications in industry, atmospheric and space sciences, medicine, energy and other fields.

Anticipated Technical Session Topics

- Breakdown phenomena and discharges
- Electrically-induced flows and electrokinetics
- Contact charging and triboelectric effects
- Charge motion and static dissipation
- Gas discharges and microplasmas
- Atmospheric and space applications
- Biological and medical applications
- Materials synthesis and processing
- Material dielectric properties
- Measurements and instrumentation
- Safety and hazards



Keynote Speakers	Affiliation
<u>Prof. Steven Barrett</u>	<u>Dept. of Aeronautics and Astronautics</u> , Massachusetts Institute of Technology
<u>David A. Dean, Ph.D.</u>	<u>Dept of Pediatrics, Biomedical Engineering, and Pharmacology & Physiology</u> University of Rochester

Conference information is available at: <http://www.electrostatics.org>.

Student Presentation Competition: Presentations by undergraduate & graduate students are eligible for the *Student Presentation Competition*. Please identify the student presenter when submitting the abstract.

Important Dates

- March 18, 2019 *Abstract submission deadline*
 April 1, 2019 *Notification of abstract acceptance*
 May 3, 2019 *Early registration deadline*
 May 17, 2019 *Final manuscript deadline*

Abstract Submission

Online submission at <http://www.electrostatics.org>

Organizing Committee

- Kelly Robinson Electrostatic Answers kelly.robinson@electrostaticanswers.com
 Bill Vosteen Monroe Electronics billy@monroe-electronics.com
 Mark Zaretsky Eastman Kodak mark.c.zaretsky@gmail.com

Technical Chair

Prof. N. K. Kishore, PhD, Indian Institute of Technology, Kharagpur, India, kishore@ee.iitkgp.ac.in

About Rochester NY: On the southern shore of [Lake Ontario](#) in [Western New York](#), [Rochester](#) (metro area population of just over 1 million) is New York's third most populous city. The [University of Rochester](#) and [Rochester Institute of Technology](#) have renowned research programs. Many important inventions and innovations originated in the [Rochester area](#), and is the birthplace of [Kodak](#), [Xerox](#), [Bausch & Lomb](#), [Gleason](#), and [Western Union](#).

ESA Awards - Call for Nominations

Dear Friends,

The ESA is accepting nominations for the following awards:

The ESA Distinguished Service Award recognizes outstanding service to the ESA over an extended period of time, with a demonstrated long-term commitment to the growth and continued well-being of the Society (requirement: 10 years as ESA member).

The ESA Lifetime Achievement Award recognizes outstanding contributions to the field of Electrostatics, as shown by the pervasiveness of the contributions in understanding certain problems or important practical benefits resulting from the work (requirement: 10 years working in field of Electrostatics).

The ESA Honorary Life Member Award recognizes exceptional contributions to both the ESA and to the field of Electrostatics, sustained over much of a career (requirements: 10 years as ESA member, 20 years working in field of Electrostatics).

The ESA Rising Star Award recognizes significant contributions at an early stage of a career to the field of Electrostatics, Requirements: age of 40 or younger, but cannot be a student).

The ESA Entrepreneur Award recognizes companies and/or individuals that implement electrostatics-related technologies and are recognized as having a meaningful impact in the industry and/or academia.

The Teacher of the Year Award recognizes outstanding teachers who use Electrostatics to stimulate learning, inspire students, or otherwise encourage and energize the learning process in a formal educational setting

in grades K-12 (requirement: 3 years teaching Electrostatics).

The Student of the Year Award recognizes middle or high school students who demonstrate outstanding achievement in Electrostatics, as showcased in laboratory projects, papers or presentations.

The ESA is also accepting nominations for induction to the Electrostatic Hall of Fame. This honor recognizes and records for posterity those individuals who have made extraordinary contributions to the field of Electrostatics. Nominees do not need to be still living. The Hall of Fame has three categories: (1) advancement of the fundamental knowledge of Electrostatics; (2) promotion of interest in the field of Electrostatics; (3) innovations using Electrostatics technology in industry.

The list of the award recipients is available at <http://electrostatics.org/esaawardwinners.html>. Nominations should be submitted electronically to the ESA Award Chair, Prof. Maciej Noras at mnoras@uncc.edu, by April 30, 2019. The nomination should be in the form of a letter from an ESA member that includes a description of how the accomplishments of the nominee satisfy the award requirements (including citations of publications or patents when relevant), the contact information of the nominator and nominee, and the names and contact information of 3 other ESA members who endorse the nomination. For the Teacher and Student awards, endorsements from two faculty members of the nominee's institution should substitute for the ESA member endorsements.

Thank you in advance for all the submissions,

Sincerely,
Maciej Noras

Current Events

A MEMS Device Harvests Vibrations to Power the IoT

John Boyd

Scientists at the Tokyo Institute of Technology and the University of Tokyo in Japan believe they have taken a step toward achieving self-powered components by developing a new type of micro-electro-mechanical system (MEMS) energy harvester. Their approach enables far more flexible designs than are currently possible—something, they say, that is crucial if such systems are to be used for the Internet of Things (IoT) and wireless sensor networks.

There are three basic ways to convert vibrations to electricity in a manner suitable to power miniature

components: electromagnetic, electrostatic, and piezoelectric mechanisms. The Tokyo Tech scientists favor the electrostatic method because it provides a wider choice of frequencies at the low-frequency range, and because the output power density is relatively larger.

A MEMS electrostatic energy harvester uses an electret (the electrical equivalent of a permanent magnet with a permanently stored charge) and a MEMS variable capacitor. The capacitor employs a movable electrode attached to a spring, which moves with ambient vibration.

The capacitance of the electret circuit is fixed, whereas the variable capacitor changes according

Current Events (cont'd.)

to the stretching of the spring. When the amount of variable capacitor charge is larger than the fixed charge, a movement of charges between the two electrodes is induced and the variable capacitor gains charge. Likewise, when the amount of charge in the fixed capacitor on the electret is larger, there is a movement of charges in the opposite direction and its electrode gains charge. It is this movement of charges that can be harvested as electricity, according to the principle of electrostatics.

“Until now, the design of MEMS electrostatic energy harvesters has been very constrained,” says Daisuke Yamane, an assistant professor at Tokyo Tech, and one of the scientists who developed the new device. The reason, he explains, is that conventional electrostatic harvesters place the electret together with the variable capacitor in the MEMS unit. “So it was difficult to optimize the design of each device element and to use the best materials for them because the electret is integrated into the MEMS structure,” says Yamane.

The answer to this difficulty was to separate the electret from the MEMS structure by fabricating two separate chips. However, this required a complete redesign of the electret. While it was housed in the MEMS unit, one of its sides was attached to the fixed electrode, while the other side was open to the air to allow capacitance to take place.

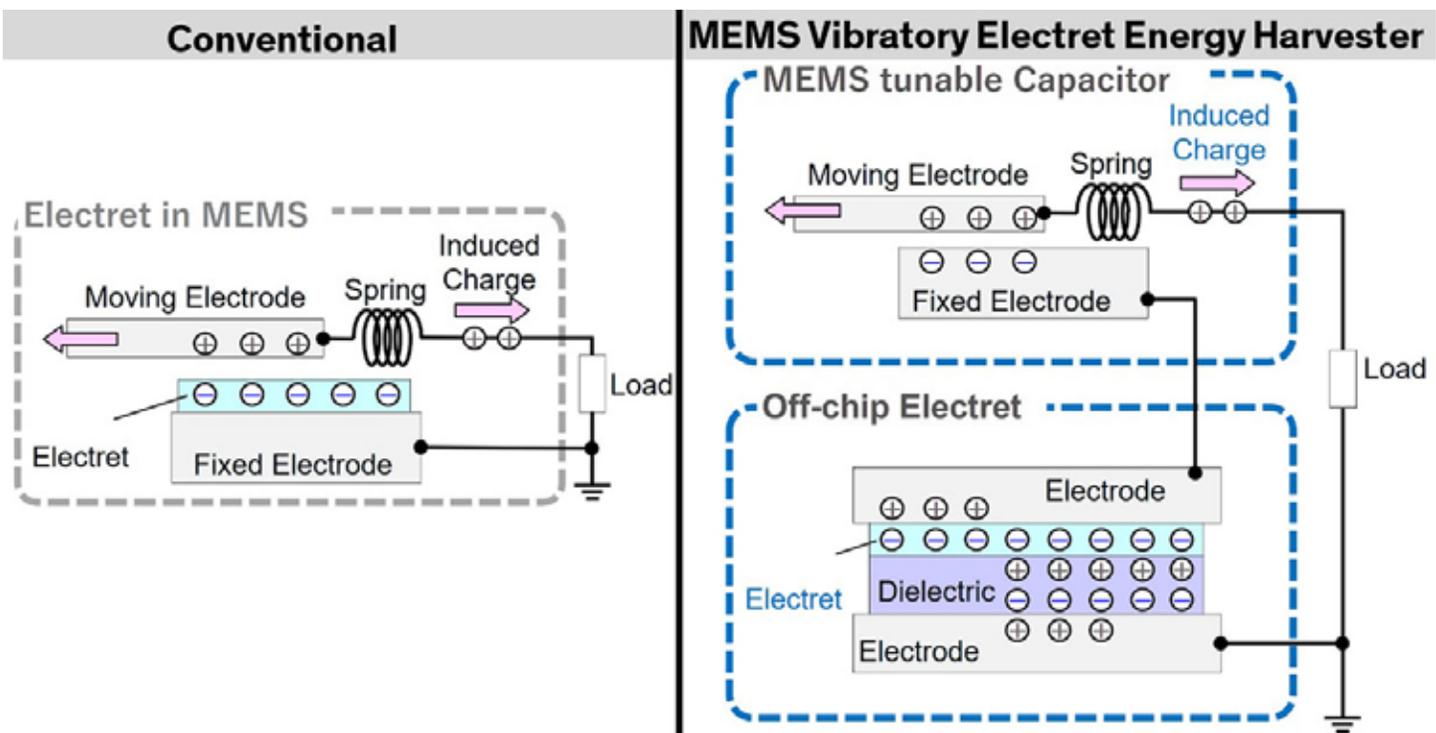
In the newly fabricated chip, there is no air gap. So the scientists fabricated an additional electrode and a dielectric layer to sandwich the electret between two electrodes.

While the concept has been demonstrated to work, a number of challenges remain. For instance, parasitic capacitance needs to be properly estimated and further reduced. This can be achieved by creating a balance in the capacitance between the variable capacitor and the electret—a key step in ensuring the technology is successful. So the team is developing a simulation environment to aid them in this task.

They also need to reduce the size of both the MEMS unit and the electret, and they need to improve the efficiency of energy harvesting by optimizing both the design of the harvester and the materials used.

“We think conventional bonding techniques will help minimize the total size and also help improve harvesting performance,” Yamane adds. He estimates these improvements will take place over the next several years, so commercialization is still some time away.

(from https://spectrum.ieee.org/nanoclast/energy/renewables/a-mems-vibration-energy-harvester-for-the-iot?utm_source=energywise&utm_campaign=energywise-02-06-19&utm_medium=email)



A.D. Moore Retrospective

A.D. Moore and the early days of the Electrostatics Society of America (ESA)

G.S. Peter Castle, Charter Member

Next year, 2020, will mark the 50th Anniversary of the founding of the Electrostatics Society of America.

The initiative for creating our organization came entirely from the late Professor Arthur Dearth Moore of the University of Michigan. I feel honoured to have known and been able to interact with A.D., as he was universally referred to, during these formative years. I now realize that I am one of very few current members who have had the privilege of working with this extraordinary man during this early period.

A.D. graduated with honours with his bachelor's degree in electrical engineering from Carnegie Institute of Technology in 1915 followed by a one year training program with the Westinghouse Electric Manufacturing Company. He then started his teaching career as an instructor at University of Michigan where he subsequently earned his master's degree followed by promotion to Professor in 1931. He was loved and respected by his students and had the special distinction of serving as Head Mentor of the Engineering College for a number of years. In this role he provided invaluable assistance to members of the freshman class in their orientation not only to the university, but also to life and to the world. Upon his formal retirement in 1965 at age 70, the Regents commented on his 48 year teaching career as follows.

“The direction of Professor Moore's academic career was determined on the one hand by his lively and various theoretical interests and on the other by his ceaseless practical inventiveness. Concerning himself in general with the analysis and application of streamline field theory, he invented the Hydrocal, a computing machine based on hydrodynamic principles, and devised instruments or techniques for determining heat transients and for simulating magnetic and heat-flow fields. Further concrete applications, which he made of this body of theory, were in such diverse fields as the dynamics of billiards, the measurement of ship roll, and the transfer of heat within living organisms. These applications, being at once novel and vivid, were of great pedagogic value, both in the classroom and in the lectures, which Professor Moore gave before a wide variety of audiences. He assisted ultimately in broadening the purview of the entire electrical engineering profession. His energies were so great and his interests so various that he enjoyed also a long career in municipal politics, serving on the Ann Arbor City Council for nearly twenty years and becoming at length Council President.”

As you can see A.D. was a man of wide interests and had an insatiable curiosity about the world around him, particularly of course anything related to electrostatics. For someone whose name is now synonymous with the field, you may be interested to know that he did not actually develop his real interest in electrostatics until after his retirement. Although no longer employed by the University of Michigan, such was his reputation that he was granted the life-long the use of a office-laboratory to pursue his fascination with electrostatics.

He was also a prolific writer and in the course of his long career typed out many thousands of pages of insights on his trusty portable manual typewriter. These ranged from pithy comments through to full books. The subjects covered topics as diverse as a treatise on the “Mechanics of Billiards, and Analysis of Willie Hoppe's Stroke” to his famous “Dirod Manual” which described the electrostatic generator he invented. His most popular work, “Electrostatics: Exploring, Controlling and Using Static Electricity”, published in 1968, was translated into many languages. In the early days of ESA he personally looked after composing this News Letter.

In this lead-up year to this milestone anniversary, it struck me that it might be of interest to share with the membership the story of our founding and provide some excerpts from these early News Letters. Our current Editor, Mark Zaretsky whole-heartedly agreed and hence this marks the first of these efforts.

Let me start in this issue with the events leading up to the official founding.

For many years in the early 1960's A.D. had tried to convince organizers within the Institute of Electrical and Electronics Engineers (IEEE) of the importance of the field of Electrostatics. IEEE did not recognize electrostatics as a specific discipline within electrical engineering. It is true that the Industry and General Applications Group of the IEEE (currently known as the Industry Applications Society) did in fact have a subcommittee on Electrostatic Processes but this did not become the Electrostatic Processes Committee until the autumn of 1968, perhaps stimulated

A.D. Moore Retrospective (cont'd.)

by A.D.'s prodding. To A.D. this was an insufficient recognition of the importance of the field. In addition, he was particularly aggrieved that IEEE stubbornly refused to change their archaic and misleading definition of the field, a subject I have written upon previously. A.D. was a very persuasive and patient proponent of his cause. However, in spite of his best efforts he was continually rebuffed by IEEE officers of the day. One of the issues was that although based on electrical engineering principles, the applications of electrostatics extended into many different fields.

After considering various options, in early 1968 A.D. decided to do something about this. He had developed an extensive network of good friends whom he had met through his initiative and interest in finding other workers in the field of electrostatics. Three of these were the distinguished meteorologists Vincent J Schaeffer, Duncan Blanchard and Bernie Vonnegut of lightning and cloud seeding fame at the Atmospheric Sciences Research Center (ASRC), State University of New York in Albany. With financial support from ASRC, A.D. organized a small informal gathering known as the Adirondack Conference on Electrostatics in Oct 1968. There were 25 invited attendees consisting of top workers in the field of Applied Electrostatics. In addition to the four gentlemen mentioned above there were representatives from various industries including Emery Miller (Ransburg; electrostatic painting), Sam Hawk (Battelle Memorial Institute; Xerography), Carpenter Hall (Carpco; electrostatic separation), Harry White (consultant; electrostatic precipitation), Gaylord Penney (Westinghouse and Carnegie-Mellon University; two stage electrostatic precipitation) and Glenn Schmiege (Physics Department, University of Wisconsin-Milwaukee), among others. In total a very distinguished group indeed.

The outcome of this meeting was a universal consensus that there was a need for a new organization devoted to the study and promotion of Applied Electrostatics. This was all the encouragement that A.D. needed. He proceeded to put together an Enabling Act to form an organization to be called the Electrostatics Society of America. This along with a proposed Constitution was circulated to 30 workers in the field on July 14, 1970. Returned ballots showed a majority approval and thus on Aug 17, 1970 the Electrostatics Society of America was formally established in Ann Arbor, Michigan. Under the terms of the Constitution members in good standing as of Dec 31, 1970 were declared Charter members. The annual dues were \$15. A reproduction of the original listing follows below.

C. L. Atkinson	S. B. McFarlane
Albert Baril, Jr.	Senichi Masuda
Duncan Blanchard	Thorn L. Mayes
Oscar Blomgren, Sr.	James Melcher
Oscar Blomgren, Jr.	Emery P. Miller
Winsor A. Brown	Robert L. Miller
G. S. Peter Castle	Charles B. Moore
Seville Chapman	A. D. Moore
Philip Cooperman	John H. Moran
H. Frank Eden	Gaylord Penney
N. J. Felici	E. T. Pierce
Charles Gallo	Herbert A. Pohl
Peter Gelfand	Jesse I. Pollard
Robert Gundlach	Richard Reid
Lawson P. Harris	Myron Robinson
Samuel A. Hawk	J. Doyne Sarter
Charles D. Hendricks	Vincent J. Schaefer
Harrison P. Hood III	Donald S. Swatek
Ronald F. Huber	Lawrence Syzdek
Albert L. Huebner	Henry R. Velkoff
Ion Inculet	Bernard Vonnegut
Oleg Jefimenko	David K. Walker
J. F. Kalbach	Thomas C. Whitmore
Richard H. Kaufman	Harry L. White
Felix J. Lyczko	Marcus Zahn

**Electrostatics
Society of America**



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ESA Information

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**2019 ESA Annual Meeting
June 10-12, 2019
Rochester Riverside Hotel
Rochester, NY, USA**