

PAPER • OPEN ACCESS

## 10<sup>th</sup> International Conference on Inverse Problems in Engineering ICIPE 22

To cite this article: 2023 *J. Phys.: Conf. Ser.* **2444** 011001

View the [article online](#) for updates and enhancements.

You may also like

- [Sustained Heating of the Chromosphere and Transition Region Over a Sunspot Light Bridge](#)  
Rohan E. Louis, Shibu K. Mathew, A. Raja Bayanna et al.
- [Generalization of the Magnetic Field Configuration of Typical and Atypical Confined Flares](#)  
Navin Chandra Joshi, Xiaoshuai Zhu, Brigitte Schmieder et al.
- [Search for Intra-day Optical Variability in Mrk 501](#)  
Hai-Cheng Feng, H. T. Liu, X. L. Fan et al.



## Breath Biopsy<sup>®</sup> OMNI<sup>®</sup>

The most advanced, complete solution for global breath biomarker analysis

TRANSFORM YOUR RESEARCH WORKFLOW



Expert Study Design & Management



Robust Breath Collection



Reliable Sample Processing & Analysis



In-depth Data Analysis



Specialist Data Interpretation

**10<sup>th</sup> INTERNATIONAL CONFERENCE  
ON INVERSE PROBLEMS IN ENGINEERING**

**ICIPE 22**

May 15-19, 2022  
Francavilla al Mare (Chieti), ITALY



## Introduction

This Proceedings of the Journal of Physics: Conference Series contains a subset of papers presented at the 10<sup>th</sup> International Conference on Inverse Problems in Engineering (ICIPE), hosted by the Department of Industrial and Information Engineering and Economics, University of L'Aquila, Italy, and held in Francavilla al Mare (Chieti), May 15 – 19, 2022.

Due to Coronavirus emergency and to protect the health and safety to all our participants, the 10th Edition, scheduled during May 18-21, 2020, and then May 16-20, 2021, was postponed to May 15-19, 2022, and termed as ICIPE 22.

Since the first ICIPE in 1993, this conference has served as the main international venue for collaboration and interaction between applied mathematicians who develop inverse analysis tools, and engineers who use these tools in many different disciplines of science such as manufacturing and machining processes, medical imaging, oil exploration, radar, sonar and seismology, space applications, non-destructive testing and so on. The 2022 meeting continued this tradition, with more than 50 delegates from many sub-disciplines of engineering, science, and applied mathematics. The number of participants was lower than the standard number of 80 – 120 due to both covid travel restrictions in some Asian and American countries and conflict in Ukraine.

The 10<sup>th</sup> ICIPE was dedicated to Professor James V. Beck for his contribution to parameter estimation and inverse heat transfer problems. Also, he played a key role in establishing this conference series. We honored his 92<sup>nd</sup> birthday on May 18, 2022. Sadly, Prof. Beck passed away on July 28<sup>th</sup>, 2022, just two months after our conference.

Our event was opened by Prof. Antonio Mecozzi, Deputy Rector, University of L'Aquila (UnivAQ), Prof. Walter D'Ambrogio, Chair of the Department of Industrial and Information Engineering and Economics, UnivAQ, Prof. Keith A. Woodbury, ICIPE Chair, The University of Alabama, and a short video of greetings from Prof. Em. Jim Beck, Honorary ICIPE Chair, Michigan State University.

The conference featured a keynote address from Professor Denis Maillet, University of Lorraine & CNRS, ENSEM - Vandœuvre-lès-Nancy, France, on “*Modelling and identification of impulse responses*,” a keynote lecture from Prof. Kyle Daun, University of Waterloo, Canada, on “*Probabilistic Data Analysis for Laser-based Nanoparticle Diagnostics*,” and a tribute to Prof. James V. Beck on his 92<sup>nd</sup> birthday, chaired by Prof. Neil T. Wright, Michigan State University. Several Jim's friends, colleagues and former students spoke about Jim throughout the tribute, including Robert L. McMasters, Kevin Cole, Kevin Dowding, Keith Woodbury, Dharmendra Mishra, Helcio Orlande, Denis Maillet and Filippo de Monte. During the tribute, Prof. Beck was connected remotely from Colorado along with his son Doug.

We are grateful for the financial support of the Department of Industrial and Information Engineering and Economics of the University of L'Aquila, as well as company sponsorship from CORDIVARI, DESIT, ENESCO, ENN.CO, EXACT, FLAMET, TECNOMATIC. We also thank University of L'Aquila and Regione Abruzzo for their auspices.

Lastly, we would like to thank all Members of the Scientific Committee and Local Organizing Committee as well as thank the Sessions Chairs, Speakers and all the participants which led to a successful and fruitful meeting.

*Filippo de Monte*

*Chair, The 10th International Conference on Inverse Problems in Engineering  
University of L'Aquila, ITALY*

December 1, 2022

## Dedication

The 10<sup>th</sup> International Conference on Inverse Problems in Engineering was held in honor of Professor James V. Beck for his contribution to parameter estimation, inverse heat transfer problems, and heat conduction. We honored his 92<sup>nd</sup> birthday on May 18, 2022. Sadly, Prof. Beck passed away on July 28<sup>th</sup>, 2022, two months after the conference and just three days after the formal acceptance of the 2<sup>nd</sup> Edition of his well-referenced “*Inverse Heat Conduction. Ill-Posed problems*” book from WILEY.



For more than 60 years, Professor Beck made outstanding contributions as a scholar and teacher. He was a well-respected and prominent contributor to several scientific and engineering communities within the United States and internationally, especially in the areas of parameter estimation, solutions to inverse problems, and Green’s functions applied to conduction heat transfer. Jim balanced his enthusiasm for research with his dedication to his wife, Barbara, and to their children and grandchildren.

Professor Beck received his B.S. degree from Tufts University in 1956, S.M. degree from the Massachusetts Institute of Technology in 1957, and Ph.D. from Michigan State University in 1964, all in Mechanical Engineering. He was a Senior Staff Scientist at AVCO Research and Advanced Development in Massachusetts from 1957 until 1962. He then joined the Department of Mechanical Engineering at MSU in 1962 as an instructor, rising to professor in 1971. Professor Beck enjoyed sabbatical leaves at Sandia National Laboratories and in Europe. His many former graduate students play prominent roles in academia, research laboratories, and in government.

As a pioneer in the field of inverse problems in heat transfer, Professor Beck exerted leadership to foster an international community in this field. The Inverse Problems in Engineering Seminars were initiated at MSU in 1988 through his impetus. These informal meetings continue to attract scholars from around the world to universities around the USA. A collaboration with Prof. Jean-Pierre Bardon started in 1982. In 1993, they instigated a meeting at ISITEM (Institut des Sciences de l’Ingénieur en Thermique-Energétique et Matériaux) within the University of Nantes, which resulted in the creation of the International Conference on Inverse Problems in Engineering (ICIPE) and in the creation of the French group METTI (Métrologie Thermique et Techniques Inverses). In 1990, Professor Beck led a delegation of participants to the First International Conference on Inverse Problems in Suzdal, USSR. In 1992, Professor Beck organized the visit of a large delegation of Russian scientists to the USA as participants of his IPE Seminar and the five-day 1st American–Russian workshop on Inverse Problems sponsored by the NSF. Two years later, in 1994, he jointly organized the second conference in this series in St. Petersburg, Russia, with Prof. O.M. Alifanov of the Moscow Aviation Institute. The workshop fostered collaborations between specialists in the field of inverse phenomena from many countries. These efforts have led to many publications, presentations, and successful students scattered across the globe. The Sixth

International Conference on Inverse Problems in Samara, Russia (May 2–7, 2010) was dedicated to Professor James V. Beck's 80th birthday.

Professor Beck authored more than 170 archival journal articles and five book chapters, as well as countless technical presentations at conferences and symposia. Many of his publications were collaborations made possible by his lifelong search for people who share his enthusiasm for discovery. Professor Beck is the primary author of four graduate level textbooks: *Parameter Estimation in Engineering and Science*, with K.J. Arnold (Wiley, 1977); *Inverse Heat Conduction: Ill-posed Problems*, with Ben Blackwell and Charles R. St. Clair, Jr. (Wiley, 1985); *Heat Conduction Using Green's Functions*, with K.D. Cole, A. Haji-Sheikh, and B. Litkouhi (Hemisphere, 1992); and *Heat Conduction Using Green's Functions*, Cole, Beck, Haji-Sheikh, and Litkouhi (Taylor & Francis, CRC Press, 2010, 2nd Ed.). The book *Inverse Heat Conduction: Ill-posed Problems* has been translated into Russian and published by Mir Publishing in 1989; it is very popular among Russian students and specialists in the field of inverse problems. Its second edition is forthcoming (Wiley, 2023) and the list of authors is as follows: Keith A. Woodbury, Hamid Najafi, Filippo de Monte and James V. Beck.

In addition to his unique contributions and leadership in various topics, he was a very productive and valuable team member. As a contributor to the *Exact Analytical Conduction Toolbox* (EXACT) project ([www.exact.unl.edu](http://www.exact.unl.edu)) funded by the US NSF in 2012, Professor Beck provided numerous heat conduction solutions and accompanying computer codes for planar and cylindrical bodies, finite and semi-infinite, one- and multi-dimensional, for short- and large-times. He has published recently on new concepts such as complementary experiments and generalized transient solutions in heat conduction.

Active in the Heat Transfer Division of the American Society of Mechanical Engineers (ASME), Professor Beck was a Fellow of ASME starting in 1988. He served as Associate Technical Editor for the ASME Journal of Heat Transfer and as Associate Editor for Inverse Problems in Science and Engineering. Professor Beck was awarded ASME Heat Transfer Memorial Award in 1998, and later served as the Chair of the Heat Transfer Division's Honors and Awards Committee. Other awards include the MSU Distinguished Faculty Award (1987) and the Tufts University Department of Mechanical Engineering Award for Outstanding Achievement in Mechanical Engineering Practice (1991).

Professor Beck brought several international researchers into his research group at Michigan State, resulting in several long-term collaborations and many friendships. The French group METTI, strongly supported by Jim Beck, was the result of a long collaboration between him and thermal engineering teams of several universities including Paris VI, Nantes, Lyon, Nancy, Poitiers, Marseille, etc. This collaboration started in 1982, prompting Jim Beck to come to France on several occasions to give talks and bring French researchers into his team at MSU. For this reason, Jim Beck was very well known, appreciated, and respected in the French heat transfer community.

An annual symposium in memory of Prof. Jim Beck will be held during the ASME Summer Heat Transfer Conference (SHTC). The first *James V. Beck Memorial Symposium: Inverse Problems, Parameter Estimation and Heat Conduction* will be held during the ASME SHTC

2023 in Washington, D.C. (July 10-12, 2023). <https://event.asme.org/SHTC/Program/James-V-Beck-Memorial-Symposium>

## References

“Professor James V. Beck on his 80<sup>th</sup> birthday,” *International Journal of Heat and Mass Transfer*, 53 (pp. 2581 - 2582), June 2010.

[doi:10.1016/j.ijheatmasstransfer.2010.02.024](https://doi.org/10.1016/j.ijheatmasstransfer.2010.02.024)

“Professor James V. Beck on his 90<sup>th</sup> birthday,” *International Journal of Heat and Mass Transfer*, 152 (Art. 119401), May 2020.

[doi.org/10.1016/j.ijheatmasstransfer.2020.119401](https://doi.org/10.1016/j.ijheatmasstransfer.2020.119401)

“Celebration of 90<sup>th</sup> birthday of James Vere Beck,” *Inverse Problems in Science and Engineering*, 28 (5), pp. 599-600, May 2020.

[doi.org/10.1080/17415977.2020.1769294](https://doi.org/10.1080/17415977.2020.1769294)

“In Memoriam Prof. James Vere Beck (1930-2022),” *International Journal of Heat and Mass Transfer*, 201 Part 1 (Art. 123593), February 2023.

[doi.org/10.1016/j.ijheatmasstransfer.2022.123593](https://doi.org/10.1016/j.ijheatmasstransfer.2022.123593)

*Filippo de Monte*

*Chair, The 10th International Conference on Inverse Problems in Engineering*

*University of L'Aquila, ITALY*

(Jim Beck's friend and colleague)

December 1, 2022

## Organizing Committee

### Local Committee

- Prof. Filippo de Monte, Conference Chair
- Prof. Angelo De Vita, Conference co-Chair
- Prof. Edoardo Mancini, Member
- Prof. Stefano Sfarra, Member
- Dr. Giampaolo D'Alessandro, Member
- Dr. Ali Deriszadèh, Member
- Mr. Simone Marasi, Member

### Honorary Conference Chair

- Prof. James V. Beck, Michigan State University, USA

### ICIPE Chair

- Prof Keith A. Woodbury, University of Alabama, USA

### IPS Chair

- Prof. Kirk D. Dolan, Michigan State University, USA

## Scientific Committee

- Prof. Oleg Alifanov, Moscow Aviation Institute, Russia
- Prof. Jean-Luc Battaglia, University of Bordeaux, France
- Prof. Ryszard Bialecki, Silesian University of Technology, Poland
- Prof. Kevin Cole, University of Nebraska-Lincoln, USA
- Prof. Kyle Daun, University of Waterloo, Canada
- Prof Kirk D. Dolan, Michigan State University, USA
- Dr. Kevin Dowding, Sandia National Laboratories, USA
- Prof. Jay I. Frankel, University of Tennessee, USA
- Prof. Shiro Kubo, Osaka University, Japan
- Prof. Denis Maillet, University of Lorraine, France
- Prof. Robert McMasters, Virginia Military Institute, USA
- Prof Aleksey Nenarokomov, Moscow Aviation Institute, Russia
- Prof Helcio Orlande, Federal University of Rio de Janeiro, Brazil
- Prof. Antonio J. Silva Neto, Universidade do Estado do Rio de Janeiro, Brazil
- Prof. Keith A. Woodbury, University of Alabama, USA

## List of Registrants

### Brazil

- **Marcelo J. COLACO**, UFRJ - Federal University of Rio de Janeiro, Brazil, [colaco@ufrj.br](mailto:colaco@ufrj.br)
- **Ivaciane de Quadra MAGALHAES**, Instituto Tecnológico de Aeronautica, Brazil, [elisan@ita.br](mailto:elisan@ita.br)
- **Rodrigo DOURADO DA SILVA**, Federal University of Itajubá (UNIFEI), [rodrigogdourado@unifei.edu.br](mailto:rodrigogdourado@unifei.edu.br)
- **Elisan Dos Santos MAGALHAES**, Instituto Tecnológico de Aeronautica, Brazil, [elisan@ita.br](mailto:elisan@ita.br)
- **Ernandes J. G. NASCIMENTO**, Instituto Tecnológico de Aeronautica, Brazil, [ernandesn549@gmail.com](mailto:ernandesn549@gmail.com)
- **Helcio R. B. ORLANDE**, UFRJ - Federal University of Rio de Janeiro, Brazil, [helcio@mecanica.coppe.ufrj.br](mailto:helcio@mecanica.coppe.ufrj.br)
- **César C. PACHECO**, Federal Fluminense University, Brazil, [cesarp@id.uff.br](mailto:cesarp@id.uff.br)

### Canada

- **Kyle DAUN**, Department of Mechanical and Mechatronics Engineering, University of Waterloo, [kjdaun@uwaterloo.ca](mailto:kjdaun@uwaterloo.ca)

### China

- **Wensheng ZHANG**, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, [zws@lsec.cc.ac.cn](mailto:zws@lsec.cc.ac.cn)

### Colombia

- **Juan D. CEBALLOS PAYARES**, Universidad Industrial de Santander, [juan2208117@correo.uis.edu.co](mailto:juan2208117@correo.uis.edu.co)
- **Kelly Jimenez DE LA OSSA**, Universidad Industrial de Santander [kelly2208121@correo.uis.edu.co](mailto:kelly2208121@correo.uis.edu.co)

### Czech Republic

- **Jakub SEVCIK**, University of West Bohemia, Faculty of electrical engineering, [jsevcik@rice.zcu.cz](mailto:jsevcik@rice.zcu.cz)

## Denmark

- **Katrine O. BANGSGAARD**, Technical University of Denmark, [kaott@dtu.dk](mailto:kaott@dtu.dk)
- **Silja W. CHRISTENSEN**, Technical University of Denmark, [swech@dtu.dk](mailto:swech@dtu.dk)
- **Frederik H. PEDERSEN**, Technical University of Denmark, [fhape@dtu.dk](mailto:fhape@dtu.dk)

## France

- **Julien BERGER**, LaSIE, La Rochelle University, La Rochelle, [julien.berger@univ-lr.fr](mailto:julien.berger@univ-lr.fr)
- **Mohamed BOUKRAA**, LMN Laboratory, University of Caen, Caen, Normandy, [mohamed.boukraa@uniacen.fr](mailto:mohamed.boukraa@uniacen.fr)
- **Suelen GASPARIN**, Cerema, BPE Research team, 44200 Nantes, [suelen.gasparin@cerema.fr](mailto:suelen.gasparin@cerema.fr)
- **Hao HONG**, University of Lyon, Doua, [hao.hong@etu.univ-lyon1.fr](mailto:hao.hong@etu.univ-lyon1.fr)
- **Philippe LE MASSON**, Université Bretagne Sud – IRDL, Vannes, [philippe.le-masson@univ-ubs.fr](mailto:philippe.le-masson@univ-ubs.fr)
- **Denis MAILLET**, LEMTA Lab, University of Lorraine & CNRS, ENSEM - Vandœuvre-lès-Nancy, [denis.maillet@univ-lorraine.fr](mailto:denis.maillet@univ-lorraine.fr)
- **Thomas PIERRE**, Université Bretagne Sud – IRDL, Vannes, [thomas.pierre@univ-ubs.fr](mailto:thomas.pierre@univ-ubs.fr)
- **Benjamin REMY**, LEMTA Lab, University of Lorraine & CNRS, ENSEM - Vandœuvre-lès-Nancy, [benjamin.remy@univ-lorraine.fr](mailto:benjamin.remy@univ-lorraine.fr)
- **Thomas TALLEC**, LMN Laboratory, University of Caen, Caen, Normandy, [thomas.taltec@unicaen.fr](mailto:thomas.taltec@unicaen.fr)

## Germany

- **Christian DÜRNHOFER**, University of Stuttgart, [cduernhofer@irs.uni-stuttgart.de](mailto:cduernhofer@irs.uni-stuttgart.de)
- **Fabian HUGGARD**, University of Stuttgart, [huggard@irs.uni-stuttgart.de](mailto:huggard@irs.uni-stuttgart.de)

## Greece

- **Sotirios D. GIOGIAKAS**, National Technical University of Athens, [giogiakas@mail.ntua.gr](mailto:giogiakas@mail.ntua.gr)

## Italy

- **Fabio BOZZOLI**, University of Parma, [fabio.bozzoli@unipr.it](mailto:fabio.bozzoli@unipr.it)
- **Luca CATTANI**, University of Parma, [luca.cattani1@unipr.it](mailto:luca.cattani1@unipr.it)
- **Daniele CORTIS**, Istituto Nazionale di Fisica Nucleare (INFN), Laboratori Nazionali del Gran Sasso (LNGS), Assergi (AQ), [daniele.cortis@lngs.infn.it](mailto:daniele.cortis@lngs.infn.it)
- **Giampaolo D'ALESSANDRO**, University of L'Aquila, [giampaolo.dalessandro@univaq.it](mailto:giampaolo.dalessandro@univaq.it)
- **Filippo de MONTE**, University of L'Aquila, [filippo.demonte@univaq.it](mailto:filippo.demonte@univaq.it)
- **Ali DERISZADEH**, University of L'Aquila, [ali.deriszadeh@graduate.univaq.it](mailto:ali.deriszadeh@graduate.univaq.it)
- **Angelo DE VITA**, University of L'Aquila, [angelo.devita@univaq.it](mailto:angelo.devita@univaq.it)
- **Giorgia FRANCHINI**, University of Modena and Reggio Emilia, [giorgia.franchini@unimore.it](mailto:giorgia.franchini@unimore.it)
- **Naoko IWATA**, University of Parma, [naoko.iwata@unipr.it](mailto:naoko.iwata@unipr.it)
- **Natalia KOLESNYCHENKO**, University of L'Aquila, [natalia.kolesnychenko@univaq.it](mailto:natalia.kolesnychenko@univaq.it)
- **Edoardo MANCINI**, University of L'Aquila, [edoardo.mancini@univaq.it](mailto:edoardo.mancini@univaq.it)
- **Fabio MENNA**, Energy Service Company, ENESCO, Treglio (Chieti), ITALY, e-mail: [f.menna@enesco.it](mailto:f.menna@enesco.it)
- **Alfredo SCIOLI**, Flame Metal Treatments, FLAMET, Miglianico (Chieti), ITALY, e-mail: [info@flamet.it](mailto:info@flamet.it)
- **Andrea SEBASTIANI**, University of Bologna, [andrea.sebastiani3@unibo.it](mailto:andrea.sebastiani3@unibo.it)
- **Stefano SFARRA**, University of L'Aquila, [stefano.sfarra@univaq.it](mailto:stefano.sfarra@univaq.it)
- **Antonello TAMBURRINO**, DIEI, Università degli Studi di Cassino e del Lazio Meridionale, Cassino (FR), [antonello.tamburrino@unicas.it](mailto:antonello.tamburrino@unicas.it)
- **Maria G. TANDA**, University of Parma, [mariagiovanna.tanda@unipr.it](mailto:mariagiovanna.tanda@unipr.it)

## Japan

- **Hiroyuki YAMAUCHI**, Department of Computer Science and Engineering, Fukuoka Institute of Technology, Fukuoka, [yamauchi@fit.ac.jp](mailto:yamauchi@fit.ac.jp)

## Romania

- **Liviu MARIN**, University of Bucharest, [liviu.marin@fmi.unibuc.ro](mailto:liviu.marin@fmi.unibuc.ro)

## Spain

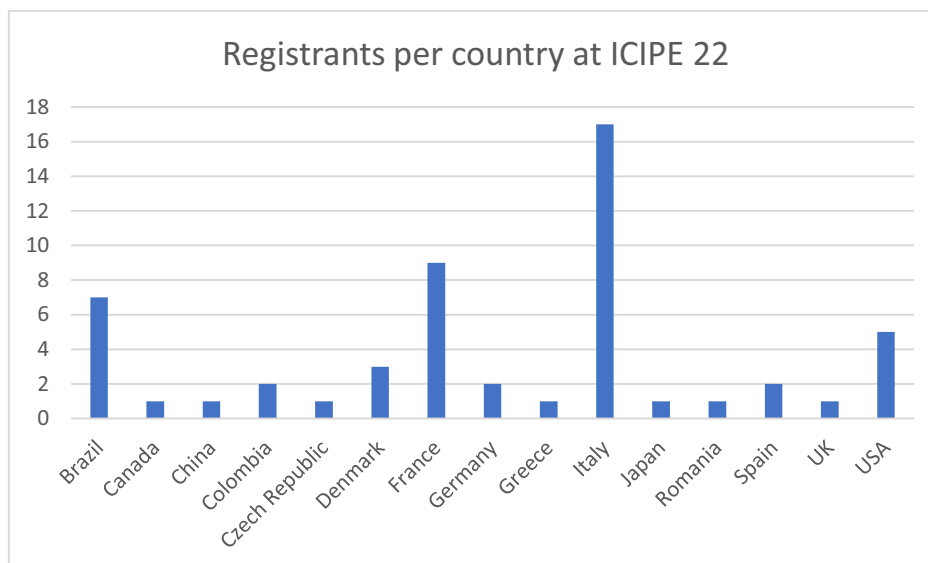
- **Antoni BANCELLS FERNANDEZ**, Universitat Oberta de Catalunya, [afernandezb@uoc.edu](mailto:afernandezb@uoc.edu)
- **Natalia ROMAGOS PLANAS**, Universitat Oberta de Catalunya, [afernandezb@uoc.edu](mailto:afernandezb@uoc.edu)

## UK

- **Adel DERISZADEH**, Times Electric Innovation Center, [adel.deriszadeh@teic.crrczic.cc](mailto:adel.deriszadeh@teic.crrczic.cc)

## USA

- **Christina CHAN**, Michigan State University, [krischan@msu.edu](mailto:krischan@msu.edu)
- **Robert L. MCMASTERS**, Virginia Military Institute, [mcmastersrl@vmi.edu](mailto:mcmastersrl@vmi.edu)
- **Anbuhkani “Connie” MUNIANDY**, Purdue University, [amunian@purdue.edu](mailto:amunian@purdue.edu)
- **Albert E. SEGALL**, The Pennsylvania State University, [aesegall@psu.edu](mailto:aesegall@psu.edu)
- **Neil T. WRIGHT**, Michigan State University, [ntwright@msu.edu](mailto:ntwright@msu.edu)



## Sponsors

We gratefully acknowledge the contributions of the following sponsors, without whom the 10<sup>th</sup> ICIPE would not be possible:

