

## **Quantum Materials for Energy Science**

Field Work Proposal Number:

### **Brookhaven National Laboratory**

Principal Investigator:

**Cedomir Petrovic**

Condensed Matter Physics & Materials Science Dept.

Brookhaven National Laboratory

P.O. Box 5000

Upton, NY 11973-5000

Phone: 631-344-7547

E-mail: [petrovic@bnl.gov](mailto:petrovic@bnl.gov)

Co-Principal Investigators:

**Igor Zaliznyak**, Physicist

**Alexei Tsvelik**, Physicist

**Weiguo Yin**, Physicist

Requested Funding FY 18: \$1,106,235

Requested Funding FY 19: \$1,132,665

Requested Funding FY 20: \$1,164,659

Total Requested Funding:xx

Use of Human Subjects: No

Use of Vertebrate Animals: No

Official Signing for Brookhaven National Laboratory:

Jim Misewich,

Associate Lab Director Basic Energy Sciences

Brookhaven National Laboratory P.O. Box 5000

Upton, NY 11973-5000

Phone: 631-344-3501

E-mail: [misewich@bnl.gov](mailto:misewich@bnl.gov)

Principal Investigator Signature/Date: \_\_\_\_\_

Laboratory Official Signature/Date: \_\_\_\_\_

## **EXPLORATORY MATERIALS SYNTHESIS AND CHARACTERIZATION**

### **Brookhaven National Laboratory**

**Field Work Proposal Number: PM-016**

**B&R Code: KC0201050**

Principal Investigator:

Cedomir Petrovic  
Brookhaven National Laboratory  
P.O. Box 5000  
Upton, NY 11973-5000  
Phone: 631-344-5065  
Fax: 631-344-2739  
Email: petrovic@bnl.gov

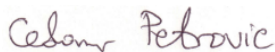
Requested Funding for 1 <sup>st</sup> year:	\$ 558,000
Requested Funding for 2 <sup>nd</sup> year:	\$ 574,000
Requested Funding for 3 <sup>rd</sup> year:	\$ 592,000
Total Requested Funding:	\$1,724,000

**Use of Human Subjects:** No

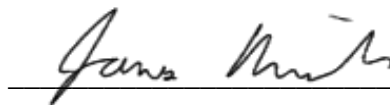
**Use of Vertebrate Animals:** No

### **Official Signing for Brookhaven National Laboratory:**

James Misewich, Associate Lab Director  
Basic Energy Sciences  
Brookhaven National Laboratory  
P.O. Box 5000  
Upton, NY 11973-5000  
Phone: 631-344-3501  
Fax: 631-344-3075  
Email: [misewich@bnl.gov](mailto:misewich@bnl.gov)



**Principal Investigator Signature/Date**



**Laboratory Official Signature/Date**

## **BULK MATERIALS SYNTHESIS AND CHARACTERIZATION**

### **Brookhaven National Laboratory**

**1. Field Work Proposal Number: PM-013**

**B&R Code: KC0202010**

Principal Investigator:

Cedomir Petrovic  
Brookhaven National Laboratory  
P.O. Box 5000  
Upton, NY 11973-5000  
Phone: 631-344-5065  
Fax: 631-344-2739  
Email: petrovic@bnl.gov

Requested Funding for 1 <sup>st</sup> year:	\$ 605,348
Requested Funding for 2 <sup>nd</sup> year:	\$ 621,774
Requested Funding for 3 <sup>rd</sup> year:	\$ 638,877
Total Requested Funding:	\$1,865,999

**Use of Human Subjects:** No

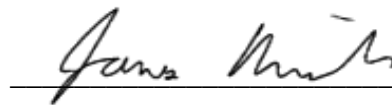
**Use of Vertebrate Animals:** No

### **Official Signing for Brookhaven National Laboratory:**

Jim Misewich, Associate Lab Director  
Basic Energy Sciences  
Brookhaven National Laboratory  
P.O. Box 5000  
Upton, NY 11973-5000  
Phone: 631-344-3501  
Fax: 631-344-3075  
Email: [misewich@bnl.gov](mailto:misewich@bnl.gov)



Principal Investigator Signature/Date



Laboratory Official Signature/Date



**Alexander von Humboldt**  
Stiftung/Foundation

Alexander von Humboldt-Stiftung · Jean-Paul-Str. 12 · D-53173 Bonn

Herrn Prof. Dr. Cedomir Petrovic  
Brookhaven National Laboratory  
Department of Condensed Matter Physics and  
Materials Science  
20 Pennsylvania Avenue, Building 510 B Physics  
Upton, NY 11973  
USA

**Der Präsident**

Ansprechpartnerin:  
Alexandra Justus

Tel. : +49 (0)228 / 833-480  
Fax : +49 (0)228 / 833-217  
E-Mail: alexandra.justus@avh.de

Unser Zeichen: 3.1-USA/1143559 STP

Datum: 5. August 2011

Sehr geehrter Herr Professor Petrovic,

ich freue mich, Ihnen mitteilen zu können, dass Ihre Bewerbung um ein Forschungsstipendium der Alexander von Humboldt-Stiftung Erfolg hatte. In Anerkennung Ihrer bisherigen wissenschaftlichen Arbeiten hat der Auswahlausschuss Ihnen ein

**Forschungsstipendium für erfahrene Wissenschaftler**

für die Dauer von **12** Monaten verliehen. Die Höhe des Forschungsstipendiums beträgt monatlich **2.450 EUR**. Der Beginn des Forschungsstipendiums ist auf den **01. November 2011** festgelegt worden.

Die "Richtlinien und Hinweise für Forschungsstipendiaten" sind Bestandteil der Stipendienverleihung.

Bitte teilen Sie dem Sekretariat der Alexander von Humboldt-Stiftung auf der beiliegenden Annahmeerklärung innerhalb von vier Wochen nach Erhalt dieses Schreibens mit, ob Sie das Forschungsstipendium zu dem angegebenen Termin annehmen.

Zur Verleihung des Forschungsstipendiums der Alexander von Humboldt-Stiftung gratuliere ich Ihnen herzlich.

Mit freundlichen Grüßen

Professor Dr. Helmut Schwarz



**Alexander von Humboldt**  
Stiftung/Foundation

Alexander von Humboldt-Stiftung · Jean-Paul-Str. 12 · D-53173 Bonn

Prof. Dr. Cedomir Petrovic  
Brookhaven National Laboratory  
Department of Condensed Matter Physics and  
Materials Science  
20 Pennsylvania Avenue, Building 510 B Physics  
Upton, NY 11973  
USA

**Der Präsident**

Ansprechpartnerin:  
Alexandra Justus

Tel. : +49 (0)228 / 833-480

Fax : +49 (0)228 / 833-217

E-Mail: alexandra.justus@avh.de

Unser Zeichen: 3.1-USA/1143559 STP

Datum: 5. August 2011

## TRANSLATION

Dear Professor Petrovic,

I am pleased to inform you that your application for a research fellowship from the Alexander von Humboldt Foundation has been successful. In recognition of your previous scientific work you have been awarded a

### **Research Fellowship for experienced researchers**

by the Selection Committee for a period of **12** months. The monthly amount of your fellowship is **EUR 2,450**. Your research fellowship is scheduled to begin on **November 1, 2011**.

The "Guidelines and Information for Research Fellows" are a constituent part of the fellowship award.

Please inform the Alexander von Humboldt Foundation whether you accept the research fellowship for the dates indicated above by returning the enclosed acceptance form within 4 weeks of receipt of this package.

I would like to congratulate you on being awarded a research fellowship from the Alexander von Humboldt Foundation.

Yours sincerely,

signed

Professor Dr. Helmut Schwarz





**BITTE ALS DOPPELSEITIGES DOKUMENT UNTERSCHREIBEN /  
PLEASE SIGN AS A TWO-SIDED DOCUMENT**

**Forschungsstipendium für erfahrene Wissenschaftler /  
Research Fellowship for experienced researchers  
Annahmeerklärung / Acceptance Form**

Jean-Paul-Str. 12 · D-53173 Bonn · Tel: +49 (0)228-833-480 · Fax: +49 (0)228-833-217  
E-Mail: alexandra.justus@avh.de · http://www.humboldt-foundation.de

Ich nehme das Forschungsstipendium an. Ich habe das Verleihungsschreiben der Alexander von Humboldt-Stiftung sowie die Broschüre "Richtlinien und Hinweise für Forschungsstipendiaten" erhalten, mit den darin enthaltenen Bedingungen erkläre ich mich einverstanden.

*I accept the research fellowship. I have received the award letter from the Alexander von Humboldt Foundation as well as the brochure "Guidelines and Information for Research Fellows", I agree to the conditions therein.*

Ich akzeptiere die folgenden Termine für das Forschungsstipendium in Deutschland:

(Änderungen bitte auf separatem Blatt begründen.)

*I accept the following dates for the research fellowship in Germany:*

*(Please comment on changes on a separate sheet.)*

<sup>December</sup> 1. November 2011 - 30. <sup>May</sup> April 2012  
1. April 2014 - 30. September 2014

*(as agreed in my communication with AvH and my host)*

Datum meiner Ankunft in Deutschland:

*Date of my arrival in Germany:*

30. November 2011

Gastinstitut, wissenschaftlicher Gastgeber:

*Host institute, scientific host:*

**Helmholtz Zentrum Dresden-Rossendorf - HZDR  
Institut Hochfeld-Magnetlabor Dresden  
Bautzner Landstraße 400  
01328 Dresden  
Prof. Dr. Joachim Wosnitza**

Die Kosten für meine An- und/oder Rückreise(n) zum Gastinstitut werden von dritter Seite getragen bzw. ich habe eine solche Unterstützung beantragt.

*The cost of my travel to and from the host institute will be borne by a third party or I have submitted an application for such support.*

Ja / Yes: ☐

Nein / No: ☒

In Höhe von / In the amount of: EUR \_\_\_\_\_

Mein(e) Ehepartner(in) und \_\_\_\_ Kind(er) wird/werden mich begleiten. **Bitte Aufenthaltszeit angeben**, ggf. auf separatem Blatt.

*I will be accompanied by my spouse and \_\_\_\_ child(ren). Please indicate period of stay, if necessary on a separate sheet.*

Ehepartner(in) / spouse: **Zorana Petrovic**

von/from: 01. Dec. 2011 bis/to: 31. May 2012

Kind(er) / child(ren):

von/from: 01. Dec. 2011 bis/to: 31. May 2012

von/from: 01. Dec. 2011 bis/to: 31. May 2012

Die weitere Korrespondenz soll an diese Anschrift gesandt werden: (Bitte korrigieren, falls Änderung.)  
*Further correspondence should be sent to this address: (Please correct in case of changes.)*

**Prof. Dr. Cedomir Petrovic  
Brookhaven National Laboratory  
Department of Condensed Matter Physics and  
Materials Science  
20 Pennsylvania Avenue, Building 510 B Physics  
Upton, NY 11973  
USA  
petrovic@bnl.gov**

USA 1143559 STP

Ich erkläre hiermit, dass diese Angaben richtig und vollständig sind und dass ich gesundheitlich in der Lage bin, das geplante Forschungsvorhaben durchzuführen.

*I hereby declare that the above statements are correct and complete and that I am not aware of any health issues that would impede my ability to carry out the proposed research project.*

Ich bin damit einverstanden, dass meine persönlichen Daten von der Alexander von Humboldt-Stiftung für administrative Zwecke, einschließlich der Begutachtung, Statistik und Evaluation durch die Stiftung und deren Beauftragte, elektronisch gespeichert und verarbeitet werden. Ich stimme ferner zu, dass die folgenden Daten durch die Alexander von Humboldt-Stiftung veröffentlicht werden dürfen: Name, Vorname, akademischer Titel, Land, Kontaktdaten der Institution, an der ich tätig bin, Stellung, Kontaktdaten der vorgesehenen Gastinstitutionen und wissenschaftlichen Gastgeber (soweit anwendbar), Förderzeiten, Datum und Umfang der Förderentscheidung, Bezeichnung der Fördermaßnahme, Fachgebiet und Schlüsselbegriffe zur Definition meines speziellen Forschungsthemas während der Förderung.

*The Alexander von Humboldt Foundation has my permission to store and process my personal information in an electronic format for administrative purposes including peer review, statistical analysis, and evaluation by the Foundation and its commissaries. The following data may be published by the Alexander von Humboldt Foundation: first name, last name, academic title, country, contact details of the institution at which I am working, position, contact details of the proposed host institutions and academic hosts (if applicable), sponsorship period, date of sponsorship decision and award amount, description of sponsorship action, research area and key words to describe my particular field of research during the sponsorship period.*

Upton, NY USA 25. August 2011

Ort und Datum / Place and date

Cedomir Petrovic

Eigenhändige Unterschrift / Personal signature



Canadian Institute for  
Advanced Research

09 June 2008

Professor Cedomir Petrovic  
Condensed Matter Physics and Materials Science Department  
Building 510B Condensed Matter Physics  
Brookhaven National Laboratory  
Upton, NY 11973  
USA

Dear Professor Petrovic,

On the recommendation of the Director, Louis Taillefer, and his Program Advisory Committee, I am delighted to confirm your appointment as an Associate in CIFAR's Program in Quantum Materials. This appointment is for the duration of the current program, and will be in effect for the period effective from this date and ending June 30, 2013.

As you are aware, CIFAR is a private, non-profit organization. Our goal is to address large questions of intellectual importance that reach beyond the knowledge base of a single individual, discipline or institution. As well, the Institute strives to build interdisciplinary research strengths in areas of special importance to the long-term scientific, economic and social development of Canada.

CIFAR is proud to welcome you as an Institute member, and over the course of your membership, we will provide you with the opportunity to meet, interact and collaborate on a regular basis with the best of your peers from across the country and around the world. You will receive full reimbursement for the travel and accommodation expenses arising from your participation in Program meetings, as per our reimbursement policy.

As a CIFAR Associate, we expect that you will:

- attend meetings of the Quantum Materials Program,
- where appropriate, interact and collaborate with your fellow Program members on research areas of interest to the Program,
- acknowledge your status as a CIFAR Associate in any publications directly influenced by your involvement in the Program or that have resulted from collaborations with other members, and
- respond to occasional requests by CIFAR staff to provide updated information for your member profile and/or feedback regarding the Program and its impacts on your work.

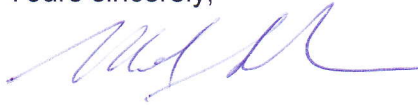


CIFAR is also involved in a range of other exciting research areas. I enclose, by way of general background, a brief overview of the Institute, the research Programs in which it is already engaged, and some areas that it is currently exploring for possible further development. I also enclose a list of all the current CIFAR Quantum Materials Program members, as well as a list of all CIFAR members, organized by institution. We will keep you regularly updated on the progress of the Institute, ensure that you are invited to key events, and provide opportunities to recognize your achievements.

Your key contacts at CIFAR are myself and Elizabeth Gerrits, Director, Programs and Research Services.

Again, I am pleased that you have accepted this appointment, and look forward to hearing of your work related to the Quantum Materials Program.

Yours sincerely,



Mel Silverman  
Vice President Research

cc: L. Taillefer, Program Director  
C. Hošek, President CIFAR  
E. Gerrits, Director Research Services, CIFAR

Enclosures



## CIFAR Program Member Annual Report

**Status: Final**

Logout

Print

First name	Cedomir
Last name	Petrovic
E-mail address	petrovic@bnl.gov
Country where you normally live and work	US
Province	Other
Program	Quantum Materials Program

In answering the following questions, please note that 2009/2010 refers to July 1, 2009 to June 30, 2010.

*Please do not use your browser's back-button while in this website. It may create duplicate records.*

**Research Highlights & Collaborations**

1. **Describe in layman's terms your most important research achievement from 2009/2010. Discuss how this work ties in with your program's overall goals/themes, and highlight any CIFAR collaborations that were involved. Also mention any key publications or other significant outcomes resulting from this work.**

*(Please Note: In answering this question, imagine you are explaining your achievement to CIFAR's public and private sector donors. We need a level of description that can be understood by individuals who are intellectually curious, successful and keen to understand your work – but haven't studied in your research area and don't know the jargon. Please explain any terminology as clearly as possible.)*

Synthesis and characterization of iron chalcogenide superconductor crystals  $\text{FeTe}_{1-x}\text{S}_x$ ,  $\text{FeSe}$ .

**Please provide a visual image (with brief caption in layman's terms) related to the above highlight that could be reproduced in CIFAR reports, presentations, or on our website.**

**Attached Image****Provide Caption**

2. **Mention any interactions or collaborations with CIFAR program members - in your own program or in another - or program meeting guests that were beneficial to you during the past year (a sentence or two about each). Also note any specific projects that emerged directly as a consequence of your CIFAR involvement. (You don't need to repeat examples that you may have already given in Question 1.)**

1. Louis Taillefer, Sherbrooke. Investigation of the structure of superconducting gap. More work is under way to



Last Saved: 07/12/2011 07:56 AM

**Status: Final**[Logout](#) [Print](#)

First name	Cedomir
Last name	Petrovic
E-mail address	petrovic@bnl.gov
Country where you normally live and work	US
Province	Other
Program	Quantum Materials

**Notes:**

- **2010/2011 refers to July 1, 2010 to June 30, 2011.**
- **Use the *Preview/Save, Edit, or Submit* buttons, instead of your browser's 'back button', to avoid creating duplicate reports.**

**Your Research Highlights and Collaborations in 2010/2011**

1. Using **layman's terms**, tell us the story of your most important research achievement. Please:

- Highlight any contributing CIFAR collaborations or interactions.
- Help us understand both the research itself *and* why it matters.
- Provide the citations of any resulting publications.

We have raised superconducting Tc in charge density wave superconductor ZrTe3 by Cu and Ni intercalation [Phys. Rev. Lett. 106, 246404 (2011), Europhys. Lett. 95, 17011 (2011)]. Moreover, superconductivity is now bulk, as opposed to fractional. ZrTe3 could be used to investigate the proposed quantum criticality in quasi two dimensional conducting states related to fluctuations of charge density wave order [Phys. Rev. Lett. 100, 106402 (2008), Phys. Rev. B 78, 085124 (2008)].

We have made considerable progress in synthesis and characterization of iron selenide and potassium iron selenide superconductors. Synchrotron clean single crystals of elusive beta-FeSe have been synthesized [Phys. Rev. B 83, 224502 (2011)], structural and physical properties of KxFe2-ySe2-zSz single crystal alloys have been thoroughly investigated [Phys. Rev. B 83, 184504 (2011), Phys. Rev. B 83, 180503 (2011), Phys. Rev. B 83, 174503 (2011), Phys. Rev. B 83, 104508 (2011)]. The last paper was a collaboration within CIFAR and was selected as an Editor's choice.

Finally, in collaboration with CIFAR colleagues we have studied the symmetry of the superconducting gap in CeIrIn5 (showing that it is inconsistent with isostructural CeCoIn5) [Phys. Rev. B 82, 184531 (2010)] and we have examined magnetic order in the field induced phase in CeCoIn5 near Hc2, showing that there are profound differences when the field is applied out of the basal plane of this material [Phys. Rev. Lett. 105, 187001 (2010)].

If possible, provide a related **high-resolution visual image and brief caption** (in layman's terms) that may be used in CIFAR's reports, presentations, or website.

**Attached Image****Provide Caption**

2. Tell us about any **interactions or collaborations** with CIFAR program members or meeting guests that were especially influential to you. Please tell us about any resulting new projects that have emerged.

1. Louis Taillefer, Sherbrooke. Low temperature investigation of the material at the quantum critical point by thermal transport.
  2. Takashi Imai, McMaster. NMR studies of iron based superconductors.
  3. John Wei, Toronto. Point contact spectroscopy of iron based superconductors. Scanning tunneling microscopy and spectroscopy of charge density wave superconductors.
- Other Canadian collaborations:
4. Zahra Yamani, Chalk River: neutron studies of iron based superconductors
  5. Jess Brewer (UBC): muon studies of heavy fermion compounds

3. Did you attend any **meetings of other CIFAR programs**?

- Which ones?
- What motivated you?
- How did the experience influence you?

No.

4. Please help us evaluate progress on our goal to support, celebrate and build capacity in gifted **early-career researchers**.

(a) Did any of your postdocs or graduate students benefit from CIFAR? In what way?

Yes, postdoc Hechang Lei and student Hyejin Ryu attended CIFAR summer schools in 2010 and 2011 respectively.

(b) **Junior Fellows:** In terms of your research, thinking, and career development:

- What does participating in a CIFAR Research Program mean to you?
- What does participating in the Junior Fellow Academy mean to you?



**Quantum Materials Program  
25<sup>th</sup> Year External Review**

**May 18-20, 2012**

**Volume 1: Report of the Review Panel**



## **Table of Contents**

<b>I:</b>	Introduction .....	<b>3</b>
<b>II:</b>	The Review Process .....	<b>4</b>
<b>III:</b>	Program Overview .....	<b>5</b>
<b>IV:</b>	State and Future of the Area of Research.....	<b>8</b>
<b>V:</b>	Critical Assessment of the Quality, Focus and Impact of the Program .....	<b>11</b>
<b>VI:</b>	Critical Assessment of the Program's Proposed Future Directions .....	<b>14</b>
<b>VII:</b>	Recommendations .....	<b>19</b>
<b>Appendix I:</b>	Quantum Materials Program Members .....	<b>22</b>
<b>Appendix II:</b>	Review Panel Members .....	<b>25</b>
<b>Appendix III:</b>	Review Criteria .....	<b>26</b>

## APPENDIX 1: Members of the Quantum Materials Program



**CIFAR**  
CANADIAN INSTITUTE  
for ADVANCED RESEARCH

### Alberta

Frank Marsiglio, Associate

University of Alberta

### British Columbia

Ian Affleck <sup>[1]</sup>, Fellow

Jean-Sebastien Bernier, Junior Fellow

Doug Bonn, Fellow

Andrea Damascelli, Fellow

Steve Dodge, Scholar

Joshua Folk <sup>[2]</sup>, Scholar

Marcel Franz, Fellow

Walter N. Hardy, Fellow

Robert F. Kiefl, Associate

Ruixing Liang, Fellow

Kirk W. Madison, Scholar

George A. Sawatzky, Fellow

Jeff E. Sonier, Fellow

Philip C. E. Stamp <sup>[3]</sup>, Associate

Fei Zhou, Scholar

University of British Columbia

University of British Columbia

University of British Columbia

University of British Columbia

Simon Fraser University

University of British Columbia

University of British Columbia

University of British Columbia

University of British Columbia

University of British Columbia

University of British Columbia

University of British Columbia

Simon Fraser University

University of British Columbia

University of British Columbia

### Ontario

John Berlinsky, Associate

William J. L. Buyers, Fellow

Jules P. Carbotte, Fellow

& Founding Program Director

Bruce D. Gaulin, Fellow

Michel J. P. Gingras, Fellow

Takashi Imai, Fellow

Stephen R. Julian, Fellow

Catherine Kallin, Fellow

Hae-Young Kee, Fellow

Yong Baek Kim, Fellow

Graeme Luke, Fellow

Arun Paramekanti, Scholar

John S. Preston, Associate

Joseph H. Thywissen, Scholar

Thomas Timusk, Fellow

John Y. T. Wei, Associate

McMaster University

National Research Council of Canada

McMaster University

McMaster University

University of Waterloo

McMaster University

University of Toronto

McMaster University

University of Toronto

University of Toronto

McMaster University

University of Toronto

McMaster University

University of Toronto

McMaster University

University of Toronto

## Quebec

Alexandre Blais <sup>[4]</sup>, Scholar  
Claude Bourbonnais, Fellow  
Patrick Fournier, Scholar  
Guillaume Gervais <sup>[5]</sup>, Scholar  
Elena Hassinger, Junior Fellow  
Louis Taillefer, Fellow & Program Director  
André-Marie Tremblay, Fellow

Université de Sherbrooke  
Université de Sherbrooke  
Université de Sherbrooke  
McGill University  
Université de Sherbrooke  
Université de Sherbrooke  
Université de Sherbrooke

## International

Philip Anderson, Associate  
Immanuel F. Bloch, Associate

Collin Broholm, Associate  
Eugene A. Demler, Associate  
Ian Fisher, Associate  
Zachary Fisk, Associate  
Randall G. Hulet, Associate  
Harold Y. Hwang, Associate  
Denis Jérôme, Associate  
Deborah Jin, Associate  
Steven Kivelson, Associate  
Gabriel Kotliar, Associate  
Karyn Le Hur, Associate  
Gilbert Lonzarich, Associate

Andrew Mackenzie, Associate

Yoshiteru Maeno, Associate  
Andrew Millis, Associate  
Kathryn A. Moler, Associate  
Cedomir Petrovic, Associate  
Cyril Proust, Associate

T. Maurice Rice, Associate  
Subir Sachdev, Associate  
Douglas Scalapino, Associate

Senthil Todadri, Associate

Hai-Hu Wen, Associate

Princeton University, USA  
Max-Planck-Institut für Quantenoptik,  
Germany  
The Johns Hopkins University, USA  
Harvard University, USA  
Stanford University, USA  
University of California at Irvine, USA  
Rice University, USA  
Stanford University, USA  
Université Paris-Sud, France  
University of Colorado, USA  
Stanford University, USA  
Rutgers University, USA  
Center for Theoretical Physics, France  
University of Cambridge, United  
Kingdom  
University of St. Andrews, United  
Kingdom  
Kyoto University, Japan  
Columbia University, USA  
Stanford University, USA  
Brookhaven National Laboratory, USA  
Laboratoire National des Champs  
Magnétiques Pulsés, France  
ETH Zürich, Switzerland  
Harvard University, USA  
University of California at Santa  
Barbara, USA  
Massachusetts Institute of  
Technology, USA  
Chinese Academy of Sciences, China

<sup>[1]</sup> cross-appointed to CIFAR's *Nanoelectronics* and *Quantum Materials* programs

<sup>[2]</sup> cross-appointed to CIFAR's *Nanoelectronics* and *Quantum Materials* programs

<sup>[3]</sup> cross-appointed to CIFAR's *Nanoelectronics* and *Quantum Materials* programs

<sup>[4]</sup> cross-appointed to CIFAR's *Nanoelectronics*, *Quantum Information Processing* and *Quantum Materials* programs

<sup>[5]</sup> cross-appointed to CIFAR's *Nanoelectronics* and *Quantum Materials* programs

## **Advisory Committee Members**

**Richard L. Greene (Chair)**

Department of Physics  
University of Maryland, USA

**J.C. Séamus Davis**

Department of Physics  
Cornell University, USA

**Tin-Lun (Jason) Ho**

Department of Physics  
Ohio State University, USA

**Allan H. MacDonald**

Department of Physics  
University of Texas at Austin, USA

**Jochen Mannhart**

Max Planck Institute for Solid State Research  
Germany

**Hidenori Takagi**

Magnetic Materials Laboratory  
RIKEN, Japan



## APPENDIX 2: Members of the Quantum Materials Program Review Panel



**George W. Crabtree (Chair)**

Senior Scientist and  
Argonne Distinguished Fellow  
Materials Science Division  
Argonne National Laboratory  
USA

**Leon Balents**

Professor of Physics  
Kavli Institute for Theoretical Physics  
University of California, Santa Barbara  
USA

**Andrey Chubukov**

Department of Physics  
University of Wisconsin at Madison  
USA

**Antoine Georges**

Centre de Physique Théorique (CPHT)  
École Polytechnique  
France

**Joël Mesot**

Director  
Paul Scherrer Institute  
Switzerland

**Jean-Marc Triscone**

Département de physique de la matière condensée  
University of Geneva  
Switzerland

**W. John McDonald**

(CIFAR Research Council Representative)  
Professor Emeritus  
Department of Physics  
University of Alberta

## Cover Page

Replace with Lana's Final Cover (Keep Table)

Project Title	Center for Computational Design of Functional Strongly Correlated Materials and Theoretical Spectroscopy
Lead Applicant/Institution	Brookhaven National Laboratory
Street Address/City/State/Zip	Condensed Matter Physics and Materials Science Department/Brookhaven Avenue Upton, New York 11973
Postal Address	P.O. Box 5000 Mail Stop: 734 Upton, NY 11973
Project Director Name, Telephone Number, email	Gabriel Kotliar Phone: 848-445-9036 Email: <a href="mailto:Kotliar@physics.rutgers.edu">Kotliar@physics.rutgers.edu</a>
Administrative Point of Contact name, telephone number, email	Alison Schwarz, Phone: (631) 344-3428 Email: <a href="mailto:aschwarz@bnl.gov">aschwarz@bnl.gov</a>
FOA Number	DE-FOA-0001276
DOE/Office of Science Program Office Technical Contact	Basic Energy Sciences/Dr. James Davenport
PAMS/LOI Tracking Number	LOI-0000011214

### 3.3 Roles/Responsibilities of Senior/Key Personnel [2.d.(1)]

**Role: Director Gabi Kotliar** has a two month/year appointment at Brookhaven National Lab, all of which will be devoted to running this project. He will also **??? days** of his time from his Rutgers appointment. He has experience in managing coding projects: he recently lead a DOE CMSN team which developed various new codes, some of which form the basis of the proposal at hand. G. Kotliar will be in direct charge of writing the GW+DMFT portion of DMFT-MatDeLab in subtask 4 (with Postdoc 2). He will also supervise the two software engineers who will be developing the software interface (subtask 1) as well as Postdoc 6 (who is tasked with developing the materials database) and Postdoc 10 (who is tasked with doing theoretical spectroscopy for the users of NSLS-II beamlines).

All BNL and LANL PIs will be supported at 5% of their time. K. Haule will be supported with 1 month summer salary. Y. Yao will be supported at 75% of his time. Nick D’Imperio who will ensure the codes run on HPCs will devote 50% of his time to this project.

The PIs have the following roles in this project:

**Table X.** Roles/Responsibilities of Senior/Key Personnel.

Principal Investigator (PI) Role	Responsibility
<b>PI K. Haule</b>	To develop the LDA+DMFT portion of DMFT-MatDeLab (subtask 2) in conjunction with Postdoc I.
<b>PI Y. Yao</b>	To develop the LDA+RISB/G portion of DMFT-MatDeLab (subtask 3).
<b>PI R. Harrison</b>	To ensure the portability of the software to future HPC platforms (with the aid of N. D’Imperio) and to oversee a demonstration project of DSL in the form of code implementing the computation of phonons within GW in conjunction with Postdocs 3 and 4.
<b>PI C. Batista</b>	To develop DMFT infused tight-binding quantum molecular dynamics (subtask 6).
<b>PIs A. Tsvelik / R. Konik</b>	To aid in the development of the DMFT Landau-Ginsburg theories (subtask 7) in conjunction with Postdoc 5.
<b>PIs E. Bozin/ S. Billinge</b>	To perform x-ray and neutron scattering necessary for subtasks 8, 9, and 10 in conjunction with Postdoc 7.
<b>PI P. Johnson</b>	To perform ARPES measurements necessary for subtasks 8, 9, and 10 in conjunction with Postdoc 8.
<b>PI M. Dean</b>	To perform RIXS measurements necessary for subtasks 8, 9, and 10 in conjunction with Postdoc 9.
<b>PIs M. Aronson/ C. Petrovic</b>	To perform crystal growth and characterization necessary for subtasks 8 and 10 in conjunction with Postdoc 11 and a graduate student.
<b>PI Q. Li</b>	To perform transport measurements for subtasks 8 and 10 in conjunction with Postdoc 12.
<b>PI M. Greenblatt</b>	To perform crystal growth for subtask 10 in conjunction with Postdoc 13.

### 3.4 Management Process [2.d.(2)]

GK: this part will be mainly done by Robert. But here are some thoughts.



# 登録原票記載事項証明書

2枚の内の1枚目

氏 名	PETROVIC CEDOMIR				
生 年 月 日	1971年 1月20日	性 別	男	国 籍	セルビア
登録証明書番号	⑤ 554656611				
居 住 地	千葉県柏市柏の葉6丁目3番地7 柏の葉第1住宅417号				
世帯主の氏名	PETROVIC CEDOMIR				
世帯主との続柄	本人				
旅 券 番 号	001428455	旅券発行年月日	2000年 3月 9日		
上陸した年月日	2008年 4月 4日	在 留 の 資 格	教授		
在 留 期 間	2008年 4月 4日から2009年 4月 4日まで				
出 生 地	BEOGRAD				
国籍の属する国における住所又は居所	LAZE STEFANOVIĆA 2 11000 BEOGRAD				
職 業	教授				
勤務先又は事務所の名称及び所在地	東京大学物性研究所 千葉県柏市柏の葉5-1-5				
備 考	上記の登録証明書番号の外国人登録証明書は、交付予定です。				
	以下余白				

上記の者は、外国人登録法の規定により登録済であり、上記のとおり外国人登録原票に記載されていることを証明する。

平成20年(2008年) 4月 9日

千葉県柏市長 本 多 晃

