Department of Physics

315 Keen Building
Florida State University, Tallahassee, FL 32306–4350

November 1, 2012 *(850) 644-6809*
Email: berg@hep.fsu.edu *FAX: (850) 644-6735*

Box 351560
Department of Physics
University of Washington
Seattle, WA 98195-1560

To Whom It May Concern:

With this letter I would like to recommend Alexei Bazavov strongly for an Assistant Professorship in your department.

Alexei was a student at the Bogoliubov Institute for Theoretical Physics in Kiev before he joined FSU in the spring 2003 semester. Immediately upon his arrival he passed the Ph.D. qualifying exam of the Physics Department with the highest score in this year. He started then to work with me as his thesis adviser on lattice gauge theory (LGT) Monte Carlo (MC) calculations and completed his Ph.D. in 2007. Resulting from this time, we published 18 papers together (9 in refereed journals and 9 in refereed proceedings). He already has 21 conference presentations and two of these talks at highly visible conferences (Lattice 2004 and APS DPF) are about our joint work.

Alexei arrived at FSU highly knowledgeable about the Linux operating system and with outstanding programming skills in C/C++ and Fortran. He insisted on programming his simulation code from scratch and along the way we combined Metropolis and heatbath concepts in a way that simplifies and/or improves the updating for a number of models [PRD 71, 114506; PRD 72, 117501 (with Heller)]. This algorithm sidetracked us into a study of U(1) LGT in the finite temperature geometry [PRD 74, 094502], which laid the groundwork for some recent joint work with Yannick Meurice's group [PRD 85, 056010].

From the physics side, we were interested in a better understanding of QCD at high temperature, which on the experimental side is pursued by heavy ion experiments and BNL and CERN. Picking up where my previous graduate student Alexander Velytsky left, we first focused on dynamical aspects of the QCD deconfining phase transition. We investigated Glauber dynamics of Polyakov loop structure factors [PRD 74, 014501 (with Velytsky)] and went on to study this for Pisarski's SU(3) Polyakov loop model in Minkowski space [PRD 78, 034024 (with Dumitru)]. In course of these investigations we started to focus on calculating for the thermodynamics of a quark-gluon plasma in a RHIC geometry those finite size corrections, which are due to the fact that the deconfined volumes are small and bordered by the confined exterior. While our original paper [PRD 76, 014502] remained limited to a simple boundary condition (BC) for pure SU(3) LGT, the results are essentially confirmed by recent work with more sophisticated BCs by Wu and myself. For deconfined volumes of a size that can be created in heavy-ion experiments cold BCs lead to an increase of their effective transition temperature. Assuming that a similar increase is still required when quarks are included, previous lattice calculations aiming at the infinite volume limit underestimate the transition temperature in RHIC. Therefore, the goal

is to move forward to full QCD simulations and with his present involvement in the MILC and hotQCD collaborations Alexei is well positioned to take the lead.

Alexei comes from a family of physicists and is therefore very much at ease with the field. He has a very pleasant personality and it is highly enjoyable to work with him. As a teaching assistant, Alexei was an excellent teacher for our undergraduate students. Later on he was instrumental in getting our graduate students into regular meetings where they discussed physics with one another. Putting everything together, I think Alexei was my best graduate student and in a sense also postdoc during my 25 years as professor at FSU. One of my previous students and two of my previous postdocs are now tenured professors (Villanova at Universitat Pompeu Fabra (Spain), Hansmann at Michigan Technological University, and Janke at Leipzig University). Also I would see Alexei in the same class as Peter Petreczky, who was recently appointed a staff scientist at BNL.

After graduating from FSU, Alexei joined the MILC and later the hotQCD collaborations. He is now at BNL on his second postdoc and I assume that senior members of the collaborations will give you an accurate account of his contributions, which I only follow from a distance. The number of his publications increased to 52 of which the paper *Equation of state and QCD transitions at finite temperature* [PRD 80, 014504] is definitely seminal work about the equation of state and chiral properties in 2+1 flavor QCD. Using improved staggered fermion actions, to which Alexei made major contributions, they are able to perform calculations with physical strange quark mass and almost physical light quark masses.

In summary, Alexei is a very talented physicists, who masters quantum field theory on a profound level and has turned out to be extraordinary versatile in applying advanced numerical methods to very interesting and challenging physics problems and obtain results that experimentalists need to interpret data. With his talents and enthusiasm he is ready for a tenure-track position at a research university or a prestigious position like the Oppenheimer Fellowship at LANL.

Sincerely yours,

Bernd Berg
(Dirac Professor of Physics)