



Preface

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The papers in this special issue are on topics presented at the International Workshop “Electrons and Ions in Quantum Fluids and Solids,” held in Mishima, Japan, from March 12, 2018, to 14, 2018. Like previous workshops on this subject, this event featured fundamental physics and applications related to charges at surfaces, interfaces and in the bulk of quantum fluids and solids, like helium, hydrogen and neon.

Electrons on the surface of liquid helium as well as “ions” (electron bubbles, charged solid helium snowballs and heavier ions) in the bulk and at helium interfaces have been investigated for decades. While in the beginning the behavior of individual charges and of ensembles in homogeneous, quasi-infinite systems was in the focus, more recently the interest has shifted to the influence of confined geometry, like the transport through narrow channels or in modulated potentials. This is also reflected in the first contributions to this special issue. Besides, electrons and ions have been used as powerful probes to study excitations in the bulk and at the surface of helium. A recent example, also presented in this issue, is the mobility measurement for investigating Majorana bound states at the surface of superfluid $^3\text{He B}$.

The Mishima Workshop was organized by Kimitoshi Kono from RIKEN (Japan) and his group. The participants use this opportunity to dedicate this special issue to Kono-sensei in recognition of his pioneering work in the field of electrons and ions at helium surfaces over many years. Kono’s scientific career started some 40 years ago, when he studied the emission of electrons out of surface states on liquid helium. Of his many ground-breaking investigations since then, just a few more recent ones shall be mentioned here: (1) by cooling the many-electron system down to very low temperatures, he has reached the highest electron mobility in a condensed matter system; (2) one of his major breakthroughs was the observation of a sliding transition, where a driven Wigner crystal overcomes the barrier imposed by the many-electron polaronic effect; (3) another consequence of electron correlations is the long-sought optical bistability, which he has found; (4) an unexpected discovery was the observation of the zero-resistance state in a low-density defect-free system; (5) yet another

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Participants of the International Workshop on Quantum Fluids and Solids, Mishima, Japan, March 12-14, 2018

spectacular result was the observation of the spontaneous symmetry breaking in the A phase of superfluid ^3He .

The community in the field of electrons and ions in quantum fluids and solids has benefitted significantly from the research of Kimitoshi Kono and his collaborators, and is looking forward to many more of his contributions.

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