Topic: 1. Quantum fluids and solids

Title: Photo-electron emission directly in superfluid helium

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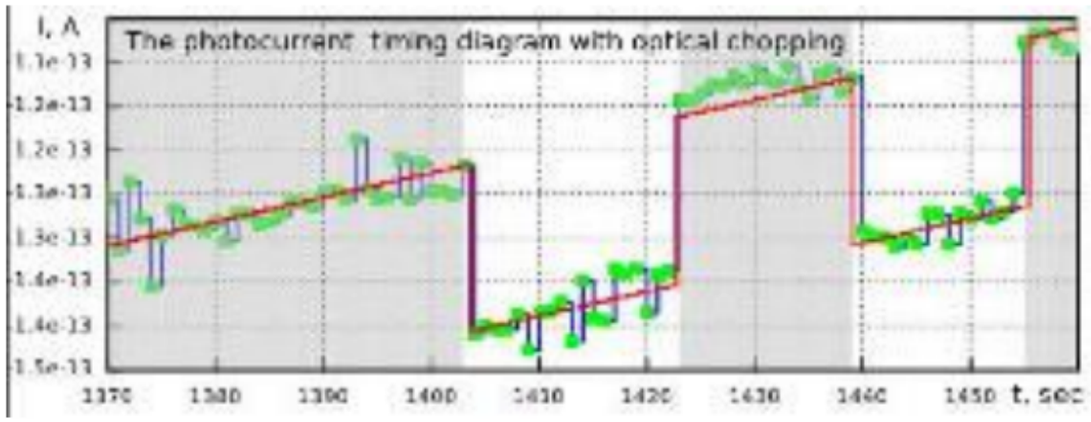
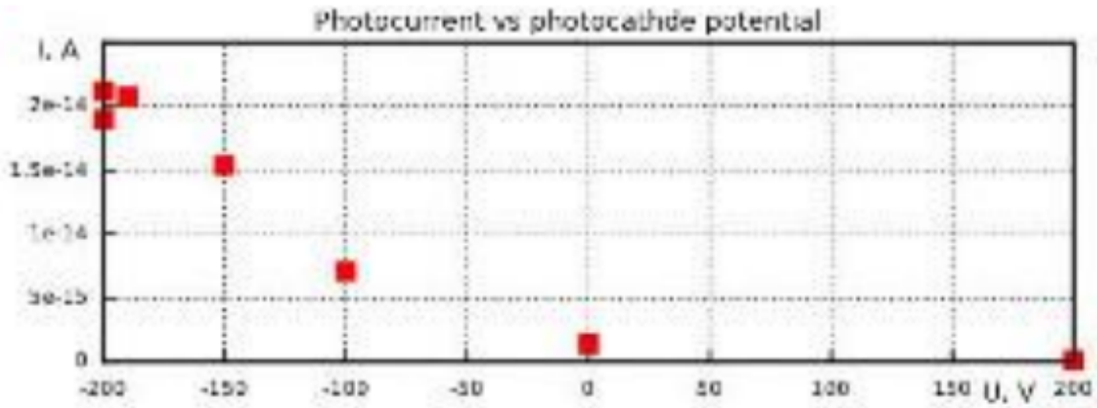
Text: Despite the fact that the electron trnsport in condensed helium were studied for over half a century [1], the observation of new intriguing effects are still appear [2]. Alas, the traditional methods of putting electrons into condensed helium (α-sources, W-thermoemitters, discharge or field emission) lead to the generation of a large number of excitations (ions, dimers, roton fluxes, etc.). As a result, the interpretation of experiments are not simple and sometimes may be questionable. In this respect, the photoelectron emitters [3] are more preferable and have been used, for example, for emission of electrons to the helium surface. However, the photocurrent vanishes if the photoemitter´s surface is covered with a helium film thicker than 1.5 nm [4].

We managed to achieve the electron currents (~20 fA) with photocathode immersed directly in condensed superfluid helium. The UV light (λ = 254 nm) was guided to the photocathode through a single core Al-covered quartz optical fiber.





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Using more complex MOM structure as emitter, which we are studying at the moment, we hope to significantly improve this result.

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