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## 1 Research notes for Cooper pair splitting

### 1.1 Electron Tunneling Phenomenon

Besides the study of the transport in bulk materials, the investigation of nano-scale system becomes important. These systems have a tunneling mechanism and conductance (instead of conductivity) is important.

In this note, we will discuss the Josephson junctions in which Cooper pair splitting shows up. We begin from a review of the tunneling calculations in the formalism of Green function expression.

### 1.2 Notes Before We Get Started

- Derivations are not complete. More notes are to be added.

### 1.3 Introduction

- Simple Junction: *{Matsubara Formalism}*