



MICROKELVIN Transnational Access Project Report

1. General Information

Project number:	AALTO 05	
Project title:	Hybrid turnstile for single electrons	
Project acronym:	HTSE	
Lead scientist: ¹	Title:	Mr.
	First name:	Martin
	Last name:	Gustafsson
	Birth date:	1979-02-25
	Passport number:	
	Research status/Position:	PhD student
	New User: ²	Yes
	Scientific Field:	Quantum Device Physics
	Home institution:	Chalmers University of Technology
	Is your home institution MICROKELVIN partner?	<input type="checkbox"/>
	Business address:	QDP group, MC2, Chalmers University of Technology
	Street:	Kemivägen 9
	PO Box:	
	City:	Göteborg
	Zip/Postal Code:	41296
	Country:	Sweden
	Telephone:	+46 707 459955
	Fax:	
	E-mail:	martin.gustafsson@chalmers.se

¹ The lead scientist indicated here is expected to participate in the campaign as a user of the infrastructure.

² Indicate 'Yes' only if the user has never visited the infrastructure before this specific project, otherwise write 'No'.

2. Project information

<p><u>Please, give a brief description of project objectives:</u> (250 words max)</p>	<p>We intend to determine the error rate of the SINIS turnstiles by counting the transport errors with an RF-SET. The results of such an investigation are interesting and publishable in themselves, but should also provide information about how the pumps can be improved to the desired accuracy. We also have the option to investigate the influence of factors such as the impedance surrounding the turnstile.</p>
<p><u>Technical description of work performed:</u> (250 words max)</p>	<p>We investigated error sources in SINIS turnstiles, mainly sub-gap leakage and device heating under the application of a high-frequency charge pumping signal. Samples fabricated in different labs were compared, and numerical simulations were done to compare the experimental results with theoretical models.</p>
<p><u>Project achievements (and difficulties encountered):</u>⁵ (250 words max)</p>	<p>The SINIS turnstiles fabricated for this project did not suffer from excessive heating, like samples previously fabricated elsewhere did. However, the sub-gap leakage current was instead unacceptably high, which led us to investigate the reasons for this in detail. These investigations showed evidence that the high sub-gap leakage is due to thermal noise coupling to the SINIS structure through the high-frequency pumping gate.</p> <p>The collaboration continues also after this grant period, with efforts to filter away the high-frequency noise, as well as to adjust the overall gate coupling to reach a good trade-off between leakage current and heating.</p>
<p><u>Expected publications and dates:</u></p>	<ul style="list-style-type: none">▪▪▪
<p><u>Submission date of user group questionnaire:</u></p>	

Completed Project Reports should be returned to MICROKELVIN Management Office (Katariina.Toivonen@neuro.hut.fi), Fax: +358 9 4512969).