

**SPITFIRE Doctoral Training Partnership (DTP)****Research Experience Placement 2017****Project Brief****Applications close at Noon, Friday, 2 June 2017**

Lead Supervisor:	Markus M. Frey
Email:	maey@bas.ac.uk
University/Research Organisation:	British Antarctic Survey
Department:	Atmosphere, Ice & Climate Programme
Project Title:	Specific detection of atmospheric nitrogen oxides at ultra-trace levels – towards understanding the self-cleansing capacity of the remote atmosphere

Total Student Support Costs: £	£2500 (£200 for 10 weeks plus £500 research and training support grant)
<i>Based on a minimum of £200/week full time for a minimum of 8 weeks and maximum of 10 weeks and a £500 Research and Training Support Grant.</i>	

Proposed Start Date: <b>Monday, 26 June 2017</b>	Proposed End Date: <b>Friday, 1 September 2017</b>
<i>Projects should run over the summer vacation and we recommend that projects will have terminated by 15 September 2017.</i>	

**Brief Summary – please provide a brief summary (maximum 300 words) of the project.**

The nitrogen oxides NO and NO<sub>2</sub> (NO<sub>x</sub> = NO + NO<sub>2</sub>) play a key role in determining the self-cleansing capacity of the polar atmosphere and therefore influence lifetime of pollutants and greenhouse gases, and ultimately climate. The British Antarctic Survey has a 2-channel chemoluminescence detector (CLD) capable of measuring NO<sub>x</sub> at ultra-trace levels, and which has been deployed previously to Antarctica. Accurate NO<sub>x</sub> measurements require minimising the influence of interfering gases i.e. specific detection of NO<sub>x</sub> gas molecules, which is being achieved with a start-of-the-art blue light converter (BLC).

The proposed project entails integration of the BLC, currently run in manual mode, into the current instrument set up. The BLC cooling will be improved and its operation will be automated for continuous runs. Tests will then be carried out in the lab on ambient air samples, including on air, which has passed through irradiated snow collected previously in Antarctica. Test results will be worked up in a short report and/or oral presentation during a group meeting.

The student will be fully integrated into the 'Atmosphere, Ice and Climate' programme, i.e. will participate in weekly group meetings, discussions, and seminars. The student will have his/her own desk with a PC to analyse test results, will have access to the warm lab after the required induction, and will meet with supervisor Frey several times per week (in the beginning daily).

The student will become familiar with all steps involved in an experimental lab research project, from theory and the environmental significance, experiment to data processing and interpretation. Skills will be improved in laboratory work including problem solving, running data processing software and written/oral presentation.

**Please give an indicative timescale for the student's work over the length of the project: (maximum 150 words).**

*This should include:*

- *The broad tasks the student will undertake;*
  - *An indicative timescale for these tasks.*
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**Week 1-2**

*Induction to lab work and safety, familiarization with the NO<sub>x</sub> instrument (theory, hardware & instrument control software, data processing software)*

**Week 3-4**

*Automation of the blue light converter (BLC): hardware connection, update of control software*

**Week 5**

*Improve cooling of the BLC unit with an additional Peltier element*

**Week 6-8**

*Run lab tests with gas standards & sample air (ambient, emissions from Antarctic snow)*

**Week 9-10**

*Plot and interpret test results in a short project report and/or oral presentation*

**Proposed procedure for appointing students, including selection criteria:**

*Please identify specific criteria that should be considered for the selection of placement students e.g. specific quantitative skills that may be required, subject knowledge etc. If a student has been pre-selected, or the research area has been led by the student, please provide the student's contact details, and a summary of their suitability for the SPITFIRE DTP REP programme.*

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I propose to have a short interview (skype or in person) with potential applicants, to confirm qualification as well as motivation to work in a team at BAS over the summer period.

Essential is a background in physics or chemistry or quantitative environmental science. Specific desirable criteria:

- motivated & good team working skills
- previous experience in lab work (e.g. university course)
- good numerical skills
- familiarity with data processing and/or programming software (e.g. Excel spreadsheet, Matlab)