JAMES MITCHELL

RADIO FREQUENCY ENGINEER

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PERSONAL STATEMENT

Diversely experienced RF engineer, incredibly motivated to continue working in this domain. Working on RF devices for particle accelerators has taught me how to design for manufacture in an inter-disciplinary field, working to deadlines for both prototypes and series production. I am yearning to move into new and novel antennas, where I want to couple my strong technical background and interpersonal skills to overcome challenges and efficiently meet goals.

PROFESSIONAL EXPERIENCE

CERN Senior Fellow (RF Engineering) *CERN | Sept. 2019 – Present*

- RF amplifier networks (MW level): Operated, maintained and upgraded four MW-level systems consisting of tetrode, IOT and solid-state amplifiers with both coaxial and waveguide distribution. Including 'on-call' duties as part of support team.
- RF impedance matching networks (MW level): Matching 1 MW RF generators to travelling wave structures. Managed designs, schedules and installation teams.
- High power RF cavity combiners: Designed resonant structures to provide single output between 100 kW and 1 MW from multiple RF inputs. Followed the manufacture and tested the infrastructure.
- RF infrastructure procurement lead: In charge of defining measurement needs, conducting market surveys, leasing with companies, purchasing equipment (up to 100 kUSD) and qualification.
- Fundamental Power Antennas: Simulation, conditioning and operation of up to 1 MW FPCs.

PhD Researcher (RF Engineering) *Lancaster University (CERN and C.I.) | Sept. 2015 – Sept. 2019*

- HOM antenna design: Designed broadband and narrowband superconducting antennas (electromagnetic 3D software). Designed innovative testing regimes for qualification. Antennas will be used for the HL-LHC upgrade.
- RF cavity testing and operation: Tested the superconducting RF crab cavities, designing kW level set-ups and antennas. Designed, set-up and operated diagnostics for the first ever proton bunch crabbing.
- RF antenna conditioning: Designed the structure to condition 400 MHz antennas.
- AWAKE klystron powered RF travelling wave structure: Tuning of electron booster. Designed and built the test stand and tuned the structure.
- VELA RF Photo-Injector (Gun): Used electromagnetic 3D simulations and bead-pull measurements to characterise the underperformance.
- RF Multipoles: Developed a new method to measure the sextupole component of an RF crab cavity using a multi-axis bead-pull system. Supervised a student working on this topic.

Radiotherapy RF Cavity Design *Lancaster University | Sept. 2014 – Jun. 2015*

- Designed normal conducting RF cavity for 24 MeV proton acceleration for hadron therapy. Designed and built bead-pull test system. Characterised cavity performance with respect to the simulated case.

EDUCATION

PhD (RF Engineering) *Lancaster University (CERN and C.I.) | Sept. 2015 – Sept. 2019*

Thesis title: Crab cavity HOMs and Impedances 🎖 (Supervisors: Professor Graeme Burt, Dr Rama Calaga)

Designed SRF HOM antennas for crab cavities, tested crab cavity HOMs with proton beam (world first).

BEng Nuclear Engineering (1st Class) *Lancaster University | Oct. 2012 – Jun. 2015*

Degree comprised of Mechanical, Electrical/Electronic and Nuclear Engineering

Individual project: Radiotherapy Linear Accelerator Design 🎖

Noteworthy courses: Electromagnetics and RF (1st class - highest grade in class), Integrated circuit engineering incl. amplifiers (1st class), Power and heat (1st class), Engineering management (1st class).

PUBLICATIONS

Conference proceedings (> 10), journal papers (> 5) and invited talks (> 10) are available at my website.

TECHNICAL PROFFICIENCIES

RF measurements: VNAs, spectrum analysers, power sensors, oscilloscopes, signal generators.

Software: CST MWS, ANSYS HFSS, SolidWorks, CATIA, SmarTeam, Microwave Office AWR, LTSPICE.

Programming: PYTHON, MatLAB, LABVIEW.

Documentation: Implementation and distribution of meaningful documentation and reporting.

ROLES OF RESPONSIBILITY

Physical Review - Accelerators and Beams (PRAB): Reviewer (generally for high power RF and couplers).

Future Circular Collider (FCC): Deputy work package leader.

CEPC External Reviewer (2019): RF antenna expert.

International collaborations: Regularly collaborating with more than 10 institutions.

Summer student supervisor: Crab cavity multipole measurements.

STEM Ambassador: Presentations and talks to high school and college students.

AWARDS AND ACHIEVEMENTS

🎖 **PhD Research Prize**: Best student research at HOMSC'18 (international conference, Cornell University).

🎖 **IMechE Project Award Medal**: Most outstanding final year research, development or design project.

🏆 Cockcroft Institute Particle Accelerator School.

PERSONAL SKILLS / ATTRIBUTES

French: Oral (B1), Written (A2)

STEM Ambassador

Additive manufacture hobbyist

Acoustic guitar (self-taught)

Skiing (Alpine and cross-country)

Indoor rock climbing

Full, clean driving license
