**Job Description (1791)**

I worked as PhD student for the CMS Collaboration Higgs group on the Higgs to two photons decay. I spent two years on placement at CERN. My main responsibilities are writing software and developing analysis techniques for the group, producing publication quality results and interpreting the outcomes, writing documentation, doing shift work on CMS and some teaching.

**What is your motivation for applying for this job? (1800)**

As a Phd student I spent two years working at CERN in the CMS Higgs group on the Higgs to two photons decay channel. Contributing to and being part of the discovery of the new boson was a wonderful experience. This position would allow me to continue this research in Higgs decays and its interface, if any, with physics beyond the Standard Model.

The great advantage of being at CERN is the amount of resources available to young researches. Firstly, the computing, proximity to experiments and depth of the physics program are second to none. Most importantly, I think, the benefit comes in the form of personal contact, discussion and collaboration with other driven and intelligent individuals with a vast collective knowledge and experience.

**Character count: 744**

**List of (up to 5) most important publications in refereed scientific journals: reference, title. In each case summarize in 2 lines maximum your personal contribution. (1800)**

CMS Collaboration, "Observation of a new boson with a mass near 125 GeV in pp collisions at sqrt s = 7 and 8 TeV", JHEP 06 (2013) 081, doi:10.1007/JHEP06(2013)081

- Produced results and statistical interpretation for two photon channel. Developed independent analysis to cross check background and categorisation.

CMS Collaboration, “Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC”, Phys. Lett. B 716 (2012) 30, doi:10.1016/j.physletb.2012.08.021

- Produced many of final results and plots for two photon channel. Developed independent analysis to cross check background and categorisation.

CMS Collaboration, “Search for the standard model Higgs boson decaying into two photons in pp collisions at sqrt 7 TeV”

- Contributed towards result production.

**Specify submission date, defence date, title of thesis and name of your supervisor; summarize your thesis in maximum 5 lines; give the most significant results obtained. (1800)**

Title: Properties of the observed Higgs-like resonance around 125 GeV in its decay to two photons at the CMS experiment at the LHC.

Supervisor: Prof. Paul Dauncey

Submission date: March 2014

Defence date: April-May 2014

I present results of the Higgs decay to two photons at CMS including three different analysis regimes including one for the main results and coupling measurements , one for the spin analysis and one which cross checks the background model. The main results are the best-fit quantities of the new boson (mass, signal strength, SM couplings) as well as exclusion limits on its spin.

**List up to 3 experiments that you have participated in. In each case summarize in 2 lines your main contribution (other than your PhD) (1800)**

BLANK

**Optionally: List of up to 5 public or internal notes to which you have contributed personally. Indicate the number of authors. (1800)**

CMS-AN-13-162, and CMS-13-230, “Handling background shape function uncertainty as a nuisance parameter, with reference to Higgs to two photons”

Main author (4 authors total)

CMS-PAS-HIG-13-016, “Properties of the observed Higgs-like resonance decaying into two photons”

Main author and editor (2 authors total)

CMS-AN-13-008, “Updated measurements of the Higgs boson at 125 GeV in the two photon decay channel”

Contributing author (67 authors total)

CMS-AN-12-032, “Use of a non-parametric background model within a multivariate analysis to search for a Higgs boson decaying into two photons in the CMS detector”

Main author (9 authors total)

CMS AN-11-343, ”Residual photon energy corrections and resolution from simulation”

Main author (3 authors total)

**List of (up to 5) presentations at international Conferences (specify talk or poster) or workshops: conference name, date, title of the talk (1800)**

**Statement of Research Interest (max 15 lines) (900)**

DRAFTS:

I have worked in the Higgs to two photon group at CMS for the length of my PhD. The discovery of the new boson last year was amazing to be part of and contribute to. With this discovery, searches for physics beyond the Standard Model (SM) have

Clearly direct searches for new physics at the LHC are important especially given the enhanced cross section of some processes when centre-of-mass energy of the collider increases next year. One of my main interests at the moment is measuring and understanding the couplings and properties of the newly discovered state as this is an excellent way of constraining indirect measurement on new Physics and will cement the Standard Model to higher precision.

---------------------------------------------------------------

I have worked in the Higgs to two photons group at CMS for the length of my PhD. The discovery of the new boson last year was amazing to be a part of and contribute towards. My research interests are fairly broad and anything, which looks for or probes physics beyond on the Standard Model at the LHC is interesting. Whether this be indirectly through rare decays, such as Bs to mu mu, and Higgs coupling measurements or by direct searches for new physics in super-symmetry or exotics. The latter will be of particular interest when the LHC turns back on at higher centre-of-mass energy given the potentially huge increase in production cross-section of a new particle which has a mass in the appropriate range. My expertise lies predominantly in using advanced analysis techniques to distinguish statistical hypotheses and measure properties.