

## **CMS Spokesperson Election 2020: Candidate Statement: Austin Ball.**

CMS faces many overlapping challenges over the next few years. With your support, as CMS Spokesperson, I intend to apply over 20 years of experience in CMS management teams to find the right pathway to overcome them in a smooth and successful way.

Over the period of the next Spokesperson mandate, it is primordial to maintain and develop the tools and teams needed to continue incisive analysis of existing and additional data samples, to continue extracting and updating top quality physics results. CMS also has to use remaining shutdown time effectively, while simultaneously preparing for Run 3, where the significant upgrades made to the detector during the shutdown must be exploited to enhance physics performance. Somewhat higher energy operation of LHC, if demonstrated to be feasible, stable and agreed amongst the LHC experiments to be worthwhile from a physics-yield perspective, will also require a substantial effort to update existing simulations and analyses, while the end of 2021 will bring a valuable period of heavy ion running on which CERN is likely to place much emphasis. These activities will overlap with the growing demands of the Phase 2 upgrade and it will be the Spokesperson's task, representing the Collaboration's wishes, to ensure the resources and motivated teams are in place to make effective progress on all fronts.

Investigating and deploying the most modern equipment and techniques (such as GPU, machine-learning, etc.) to the trigger, data acquisition, data selection, reconstruction and analysis chain, along with attracting innovative and skilled collaborators, motivated to exploit new tools for physics analyses, will be a top priority. Equally, finishing the ongoing shutdown and concluding both planned and unexpected activities within the timeframe to be agreed with CERN management, will require sustained effort from the subsystem and central teams at P5, as well as the CERN teams whose expertise we rely on. The emergence from LS2 into steady physics operation may be a protracted effort, due to the irrecoverable delays all experiments have accumulated, leading to approved, and possible additional, extensions of both the current shutdown and the year-end stop of 2021-22. Thus, from an operations point of view, the period facing the next Spokesperson is likely to comprise two shutdown periods and two recommissioning transitions, both leading into relatively short running years. The main challenge will be to use all of these periods effectively whilst keeping in mind three equally important goals. Firstly, to set-up and maintain the Phase 1 detector in the best possible condition to deliver top quality data. Secondly, to record in Run 3, with that detector, as much high-quality data as possible, extracting the best physics yield from the total event sample available to us, whilst improving the motivation for analysis teams by making efforts to streamline the timescale for bringing analyses to publication. Thirdly, to utilize both shutdown periods and the running periods to design, approve, launch and complete Phase 2 detector and supporting infrastructure upgrades as early as possible, so as to facilitate and simplify the installation activity in Long Shutdown 3. With the Technical Design Reports for almost all Phase 2 systems now behind us and the start of a storm of Engineering Design Reviews and funding agency approval reviews already happening, the Collaboration is now committed to the long and difficult task of delivering the Phase 2 upgrade and its highly demanding and concentrated conclusion, with essentially no de-scope routes, that will take place in Long Shutdown 3. That upgrade is dauntingly difficult, but very exciting from both technological and physics performance perspectives and, along with our developing campaigns to apply new technologies to triggering, data acquisition, data processing, data storage and data analysis, should help CMS to continue to attract the large number of young people on whom we depend for most aspects of our activity. They will be the key to what I firmly believe can be a spectacularly successful outcome to the upgrade. We must redouble efforts to attract them to our field and ensure their developing skills open the door to a rewarding future.

The Collaboration has embarked upon an expansion programme which, as Spokesperson, I will strongly support. Despite the initial overhead of assimilating relatively small institutes, the advantages to our CMS family of a diverse, global membership, with a wide spectrum of perspectives and expertise, are going to pay off in the long term, improving the dynamics of our teams in all areas of our scientific activity. Undoubtedly one of the accompanying challenges of the Phase 2 upgrade is the complex mechanical, electronic and firmware/software engineering of its associated systems and facilities, particularly since large parts of the existing detector will be retained and must continue to perform reliably. The Technical Coordination team has been successful in attracting new associate member institutes to some engineering and related disciplines associated with Phase 2 and, as Spokesperson, I will support finding others, covering a broad range of skills, eager to contribute state-of-the-art expertise and to take advantage of the training opportunities for their students in the unique multidisciplinary, multinational environment of CMS.

Communication will always be a difficulty for worldwide collaborations. There are no simple answers to time-zone differences, and in a world increasingly aware of the environmental consequences of business travel, CMS can find several reasons to pioneer technologies, and the training of meeting leaders, so that remote participation is as simple and effective as we can make it. Encouragement to participate in wholly virtual meetings, especially where the scale is not too large and every participant is video-interfacing through a laptop, could help to train people to make the best out of what is available and affordable. As we have seen in Technical Coordination, this can even improve team efficiency over the half hour travel time between CERN main site and the CMS experiment!!

Its global nature notwithstanding, CMS is nonetheless dependent for its existence on our unique experimental apparatus, embedded in the facilities at CERN, thus our relations with CERN's management, technical departments and administration, with the Commune of Cessy, as well as with the other major experiments, are of vital importance. In particular the next Spokesperson team will have to rapidly establish an excellent working relationship with a revised CERN management team, although many key interfaces will most likely be unchanged. Here, I would expect to bring to bear effectively, in a more general context, my experience, gained alongside seven CMS Spokesperson teams, of fulfilling the mandate of Technical Coordination, in certain areas, to represent to either party (Collaboration or CERN) the interests or requirements of the other. Excellent relations between the Technical Coordination teams of the four LHC experiments have been a focus of mine and have scope to be extended further. There are many synergies that can be profitably exploited without losing the incentive of healthy scientific competition.

An (overwhelmingly voluntary) outreach effort has been a feature of the activity at the CMS site which I have supported strongly and the welcoming of public visitors (numbering 40,000 last year) into the heart of our experiment activities, along with virtual visits and the various special events on the site and worldwide, have, I believe, helped to keep CMS and particle physics in the public eye as an activity worthy of support. This is an area we must never neglect. We have no inherent right to the public money (we and CERN) rely on and the Collaboration worldwide has a leadership role to play in connecting people to the motivation for fundamental science and the challenges posed by pursuing scientific curiosity to the limits available to us.

As I will shortly conclude my Technical Coordination mandate by ensuring a smooth transition of responsibility to experienced successors, I note that my time as "user" at various particle physics labs in Europe and the US still exceeds that spent as a CERN staff member and so I feel I am well able to represent the "user", as well as the "experiment" viewpoint effectively.

Whether as a collaboration member or as Spokesperson, I look forward to working together with you on the challenges the future will bring.