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CFD thermal studies of the air inside the storage ring tunnel of the ALBA synchrotron light source for the 3rd and 4th generation designs

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The ALBA Synchrotron is currently designing its new version to become a 4th generation particle accelerator. In this new scenario, ALBA would produce a brighter and more coherent photon beam. As a result, ALBA would provide capabilities hitherto inaccessible in terms of resolution, detection levels and understanding of chemical and electromagnetic properties.
In this context, the thermal and geometric conditions inside the tunnel will be modified, specifically the Storage Ring. The Booster Ring, Transfer Lines, Air Conditioning System and the tunnel itself will not be modified. The prediction of the thermal behaviour of the air inside the tunnel for the 4th generation is essential, considering the influence of the stability of the air temperature on the stability of the electron beam orbit. The present work assesses Computational Fluid Dynamics (CFD) studies of the air inside both the current and the 4th generation ALBA tunnel. Comparative studies of the temperature distribution in the air are performed and proposals for the optimization of the air conditioning system are presented. The studies are based on the FLUENT software of ANSYS WORKBENCH.

Footnotes

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