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Ionic strength and temperature dependent conformational changes of the wheat Hsp90 protein

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Heat Shock Protein 90 kDa (Hsp90) is ubiquitous chaperone protein that plays important role in protein folding and maintaining proper folds and conformation of many cellular factors like kinases and transcription factors [1].

Hsp90 forms dimers in solution. Each monomer consists of three domains: N-terminal ATPase domain, middle domain, that plays role in substrate protein binding process and C-terminal dimerization domain. Hsp90 protein in solution exists in equilibrium between two conformations: open and closed. In closed conformation besides C-terminal dimerization also N-terminal domains of two monomers interacts with each other. Equilibrium is species dependent and other factors like pH and presence of small molecule osmolites can cause changes in it [2].

In this study we investigated the effect of the ionic strength on the conformation of *Triticum aestivum* Hsp90 protein (TaHsp90) in apo, ADP and AMPPNP bound states. We also examined effect of temperature on Hsp90 protein without bound nucleotides. In the low ionic strength conditions Hsp90 protein exists in rather compact conformation characterized by the maximum particle size (D_{max}) equal to 22 nm in both nucleotide bound and apo states. Ionic strength cause shift to the more open, expanded conformation characterized by the D_{max} equal to 30 nm. Higher temperatures also changes equilibrium to the more extended conformation. Detailed analysis revealed that TaHsp90 can exist in three different conformation in solution and equilibrium between those states is ionic strength and temperature dependent.

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References

[1] M. Taipale, D.F. Jarosz, S. Lindquist. *Nat. Rev. Mol. Cell Biol.* **11** (2010) 515-528.

[2] K.A. Krukenberg, T.O. Street, L.A. Lavery, D.A. Agard, *Q. Rev. Biophys.* **44** (2008) 229-55.

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Electron beam dynamics calculations for POLFEL linear accelerator

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The poster presents beam properties calculation for the superconducting linac of free electron laser POLFEL [7] Normalized slice emittance and bunch size are tracked for the 1.6-cell superconducting injector with solenoid followed by 2-structure cryomodules [4] of HZDR-type.

Main results are taken from ASTRA [2] 2D calculations. First the cavity and solenoid were tested in order to find the most suitable parameters to meet the expected values. It was optimized for the slice emittance. After that stage the cryomodules were added and now the beam size was honed due to its great focusing and reaching values near zero.

In the meantime 3D calculations are performed for the model using tools such as CUBIT [3], ACE3P [1], Para View [6], Microwave Studio [5]. At the moment we are trying to add couplers to the cavity, which make the model very complex. As soon as we deal with that we wish to calculate emittance for the 3D model of the cavity with solenoid and cryomodules.

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References

[1] *ACE3P - Advanced Computational Electromagnetic Simulation Suite,* SLAC, https://portal.slac.stanford.edu/sites/ard_public/acd

[2] K. Floettmann, *ASTRA, A Space Charge Tracking Algorithm, v. 3.0,* October 2011, www.desy.de/~mpyflo/Astra_dokumentation

[3] *CUBIT*, Sandia National Labs, www.cubit.sandia.gov

[4] P.A. McIntosh et al, Realisation of a prototype superconducting CW cavity and Cryomodule for energy recovery, *SRF2007*, Beijing, 864-868, (2007)

[5] *Microwave Studio*, CST, www.cst.com/Content/Products/MWS/Overview.aspx

[6] *ParaView*, Kitware, www.paraview.org

[7] *POLFEL - Project Description*, polfel.pl/doc/polfel_booklet_en_2012_10_28-b.pdf