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Examining the Time Variation of Electrostatic Fields of Pyroelectric Crystals Using A Scanning Electron Microscope ZUMRAD KABILOVA, BENJAMIN SAEKS, Goucher College — Pyroelectric crystals are known for their instantaneous polarization under temperature change. In vacuum, the electrostatic fields due to their polarization are significant and useful for particle acceleration. We are using SEM (Scanning Electron Microscope) to evaluate the electrostatic fields of LiNbO3 crystals. In addition to scanning and producing magnified images, SEM's high voltage beam of electrons can serve as another measuring tool. In our project, we used the deflection of the beam under the influence of the electric field to measure the time-variation of field strength. These results were compared to experimental measurements of the crystal's surface charge to confirm that time-variation of the field strength behaved accordingly with the polarization and neutralization of charge. Furthermore, a theoretical model of the field production was developed to fit the experimental data. The path of the beam and the distribution of the electric field due to the crystal's surface charge were also modeled numerically using OOPIC simulation. The strength of the electrostatic fields were found to be in the range of 10 MV/m and were present for several minutes due to pyroelectric effect and slow neutralization of charge.

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