Radiation-Damage Study of a Monocrystalline Tungsten Positron Converter, X. ARTRU, R. KIRSCH, IPN-LYON; R. CHEHAB, LAL-ORSAY; B.JOHNSON, SSRL-STANFORD; P.KEPPLER, J.MAJOR, MPI-STUTTGART; L.RINOLFI, CERN*; A.JEJCIC, LPC-CDF-PARIS - The interest in the exploitation of the channelling-induced enhancement in positron sources, intended to use in Linear Colliders (LC), relies on the long-term resistance of the crystal to radiation damages. Radiation damages in a monocrystalline tungsten converter, caused by Coulomb scattering of the intense electron beam on the nuclei of the converter, have been tested in the converter region of the SLAC Linear Collider (SLC). The tungsten crystal with a thickness of 0.3 mm was kept in the 33 GeV incident electron beam of the SLC positron source during 6 months. The total electron flux experienced by the sample was 2×10^{18} mm^{-2}. It is comparable to the fluence reached in the BNL experiment using a 28 GeV proton beam on a Silicon crystal. In both experiments the crystals were randomly orientated. The tungsten monocrystal was analysed before and after irradiation by gamma diffractometry. No damages were observed, the mosaic spread remained unchanged during irradiation (0.5 mrad FWHM). After a short introduction to the fields of radiation damage and channeling, the methods for crystal analysis and the SLAC experiment are described and the results discussed. Practical considerations for the use of such crystals as positron sources for future linear colliders are also provided.

* At SLAC (for one year sabbatical leave) during the crystal test