ESRF	**Experiment title:** HIGH PRESSURE-HIGH TEMPERATURE POWDER DIFFRACTION ON ZNAL-SPINEL:CATION ORDER	**Experiment number**: CH-802
Beamline: ID30	**Date of experiment**: from:09.10.99 to:13.10.99	**Date of report**:
Shift: 12	**Local contact(s)**: M MEZOUAR	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Davide Levy **Dip.Scienze Mineralogiche/Petrologiche Uni.Turin**

Vittoria Pischedda **Dip.Scienze Mineralogiche/Petrologiche Uni.Turin**

Nadia Curetti **Dip.Scienze Mineralogiche/Petrologiche Uni.Turin**

Mario Mondonico **Dip.Scienze della Terra Uni.Milan**

Report:

Spinels ($A^{2+}B_2^{3+}O_4$) are an important family of oxide minerals. They present two different cation sites commonly addressed as M and T, with multiplicity 16 and 8, respectively: the former is octahedral coordinated, the latter tetrahedral. If all A-cations enter the T-sites, and as a consequence all B-atoms dwell at six-fold coordination sites, the structure is named ‘’normal’’. if half B-cations move to the T-sites, the structure is called ‘’inverse’’. Intermediate arrangements, formally defined by the are common in natural and synthetic spinels, and are dependent on the chemistry of the two cations and on the temperature conditions of crystallization and/or annealing. Many works have been to date devoted to study the effect of temperature on the inversion degree, but the role of pressure combined with heating on this transformation is yet not studied.

In this work we collected powder diffraction data as a function of temperature and pressure (i) to determine the Equation of State and (ii) to study the order disorder reaction mentioned above in high-temperature and high-pressure regime, in $ZnAl_2O_4$ [gahanite]. To achieve this goal, we have performed powder diffraction data collections at ID30 by means of the Paris-Edinburg high-pressure cell with NaCl as pressure standard along four isotherms (298, 473, 673, 873 K) and three isobars (2, 15 and 30 kbar). In Figure 1 and Figure 2 we report the powder diffraction patterns at 473 K and 80 kbar, and 1323 K and 32 kbar. The use of the recently developed Soller slit-system has significantly enhanced the quality of the high pressure and temperature data collectable at ID30 by ruling out the spurious contributions of the environment. The data analysis is presently in progress, though difficulties are being

encountered due to large 2θ-shifts, and to the complexity in determining reliable pressure values.

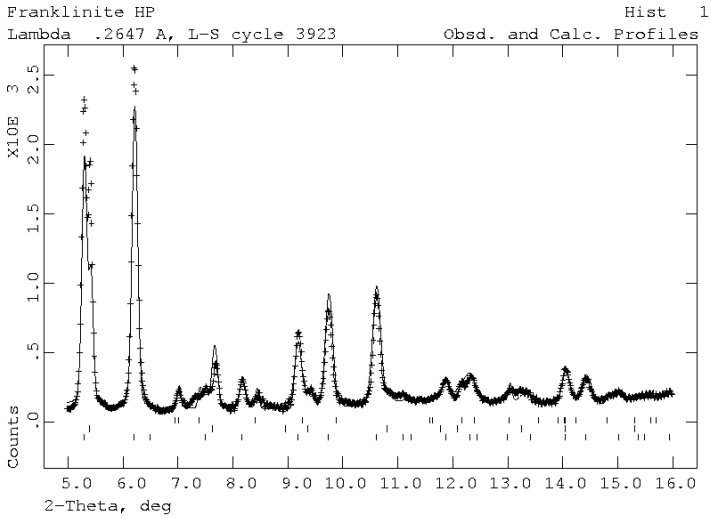

Fig.1

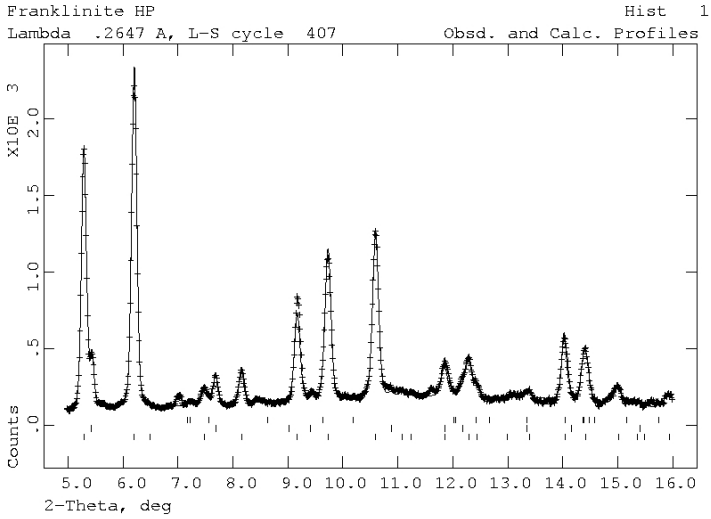

Fig.2