

Brief description of selected publications

1) Periodic interference structures in the timelike proton form factor
A. Bianconi and E. Tomasi-Gustafsson
Phys.Rev.Lett. **114**, 232301, 1-5 (2015).

This work gives evidence of resonant structures in the data measured by the BABAR collaboration for the cross section of the annihilation reaction of proton-antiproton into an electron-positron pair. It is shown that these structures become periodical, when plotted versus the relative momentum of the produced hadrons, showing the interference of two mechanisms at the moment of the hadron formation, one acting at quark level, and the other at the hadron scale.

2) Model independent properties of two photon exchange in elastic electron proton scattering
Michail P. Rekalo, Egle Tomasi-Gustafsson
Eur.Phys.J. A22 (2004) 331-336

Properties of hadrons are studied from elastic or inelastic electron scattering, assuming that the interaction occurs through one photon exchange. A significant contribution of two photon exchange at large momentum transfer would invalidate the formalism, and bring to a revision of hadron properties. The calculations are largely model dependent, as they depend on hadron structure. Model independent properties of two photon exchange are derived, concerning the cross section and the polarization observables. The possible signatures of such a mechanism are illustrated. Experiments looking for the presence of this mechanism have been performed since.

3) Measurement of G_{Ep} / G_{Mp} in polarized $e p \rightarrow e$ polarized- p to $Q^2 = 5.6\text{-GeV}^2$
O. Gayou et al., Jefferson Lab Hall A Collaboration,
Phys.Rev.Lett. **88** (2002) 092301

The paper reports on the measurement of the ratio of the electric and

magnetic form factors of the proton, G_{Ep}/G_{Mp}, at the Thomas Jefferson National Accelerator Facility (JLab) using the recoil polarization technique. The results confirm a deviation of this ratio from a constant behavior as a function of the momentum transfer, contrary to what previously assumed. This measurement arised a strong debate in the community, stimulated a revision of the nucleon models and called for further experiments. The polarization method appears very successful, this experimental program is continued after the upgrade of JLab, and it is applied also to neutron.

4) A Vector and tensor polarimeter for high-energy deuterons
E. Tomasi-Gustafsson, J. Yonnet, V. P. Ladygin, J. Ball, L. Bimbot, Y. Bisson, M. Boivin, Yu. Borzunov, J. L. Boyard, N.E. Cheung, Ph. Courtat, R. Gacougnolle, R. Skowron, L. Golovanov, T. Hennino, M.K. Jones, R.A. Kunne, C.F. Perdrisat, N.M. Piskunov, V. Punjabi, I. M. Sitnik, E.A. Stokovsky, A.P. Tsvinev.
Nucl.Instrum.Meth. **A420** (1999) 90-100

A vector and tensor polarimeter for deuterons up to 2 GeV kinetic energy, based on (d,p) elastic scattering was conceived, built, tested and used for a physical experiment at the SATURNEII accelerator. A liquid hydrogen target covering the focal plane of the SPESIV spectrometer and up to 30 cm long was built and put into operation.

5) The Nuclear Spin Response to Intermediate Energy Protons and Deuterons at Low Momentum Transfer
F.T. Baker, L Bimbot, C. Djalali, C. Glashausser, H. Lenske, W.G. Love, M. Morlet, E. Tomasi-Gustafsson, J. Van de Wiele, J. Wambach, A. Willis.
Physics Reports **289** (1997) 235-382.

This report collects the results obtained at Los Alamos and SATURNE from a systematic study of inelastic scattering of polarized protons and deuterons on different targets, from C to Pb. Based on new polarimetry techniques, the isoscalar spin strenghts for excited levels and in the continuum were determined for the first time. The nuclear spin response was measured and understood in frame of RPA calculations.