CRYSTAL: A Storage Ring for Crystalline Ion Beams, L. TECCHIO, (CSR Collaboration), INFN-LNL - We present the project of a storage ring (CRYSTAL) dedicated to the ion beam crystallization at the Legnaro Laboratories. The lattice has been designed in order to reduce the phenomena acting against beam ordering such as intra-beam scattering and envelope instability. The criteria adopted for designing the storage ring will be discussed. The design of the project has been optimized for the study of crystalline beams; but provisions have also been made for carrying out experiments of different nature with applications to nuclear, atomic and molecular physics. The storage ring has a circumference of 70 metres and a maximum magnetic rigidity of 3.8 Tm. It has a periodicity of eight, made of eight dipole magnets surrounded by doublet quadrupoles, sextupoles and an insertion free of magnets 3.4 metres long. Electron and laser cooling devices will provide low beam temperatures. The existence of stable ground states for crystalline beams is demonstrated by computer simulations and their configurations depend on the focusing parameters of the storage ring.