学术报告

题　　目：Layered and polymeric structures of simple systems at high pressures

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报告摘要： **Solid oxygen is in many aspects an unusual crystal. O2 is the only elementary molecule that carries a magnetic moment, and solid oxygen is the only elemental solid which is antiferromagnetic insulator at low temperatures. It adopts a layered structure where molecules lie perp endicular to these layers due to the magnetic interaction. At high pressures, in the epsilon phase which exists between 10 and 100 Gpa, solid oxygen is made of clusters made of 4 molecules: the O8 molecule. This process is expected to determine a collapse of the magnetism but there is still a debate in literature on it. Recently it has been proposed a new phase transition inside the epsilon phase corresponding to t he collapse of the molecular magnetic moment between epsilon1 and epsilon0 phases. I will show my on going experimental work aiming to discover this transition and the future research on it. CO is a typical nonpolar molecule containing polar bonds. Its structural changes under pressure involve the breaking of double bonds C=O and the forming of C−O bonds and have been intensely studied over the past two decades. Furthermore, CO2 is one of the most important materials of the giant planets in the solar system, such as Mars and Venus. The study of its high-pressure structural changes provides crucial knowledge for planetary science and geophysics. Theoretical and experimental studies on CO2 have focused on the molecular phases and their transition to the non molecular 4-fold extended solids. No experiments have ever been reported above 120 Gpa and some simulation works agree on the formation of a new layered four fold coordinated structure at about 200 GPa which I propose to experimentally discover and investigate. Similarly to CO2, also SO2 and CS2 show or are predicted to manifest and evolution of carbon coordination from 2 fold to 3 and even 4 fold. I'll describe the most relevant literature and the ongoing research aimed to discover layered and polymeric structures of these systems.**

报告人简介： **Gorelli 教授数十年来一直从事高压科学的最前沿实验研究工作。至今，已发表过数十篇学术论文，其中在Nature及其子刊Nature Materials、Nature Physics、Nature Communications上以主要作者身份发表多篇文章；在物理领域权威国际刊物Physical Review Letters上发表论文多篇，其中一篇“The epsilon phase of solid oxygen: evidence of an O4 molecule lattice"被《纽约时报》重点报道。**