

Antiferromagnetism

The most important magnetic behaviors of the antiferromagnets are the magnetic phase change with increasing magnetic field, especially a field applied along the easy axis; that is, the direction of the magnetic moments. The magnetic energy in the parallel arrangement in Figure 1 exceeds the assumed energy in the perpendicular arrangement in Figure 1

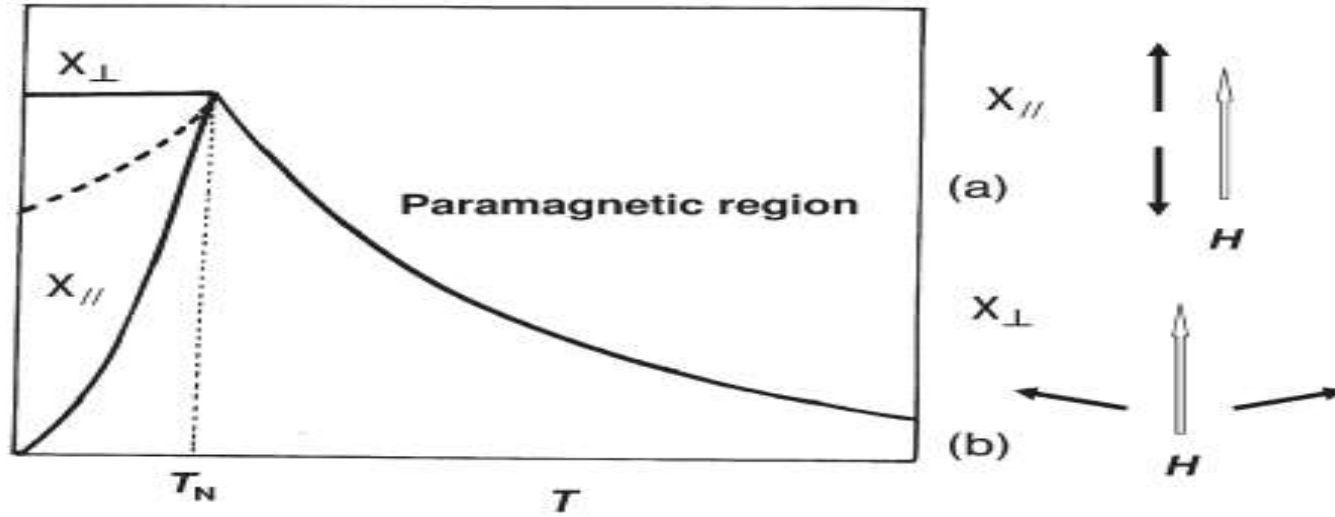


Figure 1 Magnetic susceptibility of an antiferromagnet. The dashed line indicates a powder susceptibility at the antiferromagnetic region, $T < T_N$

At a certain magnitude of the magnetic field, and the parallel orientation abruptly changes into the perpendicular one, conserving the antiparallel orientation. This magnetic phase change induced by the magnetic field is called the “flopping” of the magnetic moments or spins.

Thus, the state is called the “spin - flopped” state, and the magnetic field which induces the transition is named the “critical field”, H_{cr} , or “spin - flop field”, H_{sf} .

Ferrimagnetism : Ferrimagnetism is a special case of antiferromagnetism where the opposed moments are of different magnitudes and a large net magnetization thereby results . The spins are thus unbalanced . The difference in magnitudes can arise in several ways .

Ferrites : The atomic or ionic magnetic moments in one direction are different from those oriented in opposite directions , resulting in a net magnetization that is quite small . These substances are called **ferrites** .