The PVLAS experiment at LNL (Italy) reports the experimental observation of vacuum magnetic dichroism (and birefringence). If this result is confirmed –many alternative experiments have been proposed to test it– theory will have to explain an intriguing new physics phenomenon. I will describe the experimental set-up and the effect observed. Then I will review the models suggested to explain the PVLAS anomaly including axion-like particles and ‘millicharges‘. Cosmological implications and constraints will also be discussed.