that interacts with a magnet in the levitated element so that the magnetic potential energy of this interaction increases for displacements of the element from its stable position in directions parallel to a stability plane and decreases for displacements of the element from the stable position perpendicular to the stability plane. Any movement perpendicular to the stability plane is sensed and used by a feedback control system to control a force applied to the levitated element to stabilize the element against displacement from the stable position in directions perpendicular to the stability plane.

Dutch patent NL2000863 by Jansen discloses an apparatus for orienting a magnetic object in free space with the aid of magnetic levitation, the apparatus comprising a magnet array comprising one or more magnets and arranged in a circle around an imaginary axis, which magnet array generates a static magnetic field with an equilibrium location in this field at which the magnetic object can be maintained. Further disclosed are sensor means for detecting location deviations between the current location of the magnetic object and the equilibrium location and, based on the result of the detection operation, for generating and delivering control signals; a coil array comprised of various controllable coils, the coil array generating a controllable magnetic field for maintaining the magnetic object at the equilibrium location, each coil of the coil array being arranged at least partly outside the circle in radial direction from the imaginary axis. The apparatus is characterized in that the magnetic polarization of the magnetic object is opposite to that of the magnetic array. As a result, the magnetic object can be maintained more stably at an equilibrium location by means of magnetic levitation, while the correction coils oriented to the exterior can exert a large correction force on the magnetic object so as to maintain the object at its equilibrium location.

USA patent application US 2002/0124765 A1 by Hansen discloses a method to maintain magnetic levitation that is stabilized by means of Hall Effect sensors. The method and device comprise a Hall Effect sensor or sensors used to control one or more electromagnetic coils to maintain the position between two magnets or objects. Hansen proposes to use the method to suspend a magnet in a high pressure tube that is magnetically coupled to a magnet outside the tube connected to an analytical