CLAIMS

What is claimed is:

1. A method for accurately detecting and controlling a position of an optical head of an optical disk, wherein a spherical wave is used as reference light for cross-shift multiplexing holographic storage, and a position deviation signal is obtained by using holograms staggered in a position control unit in a storage medium for accurate detection and control of the position of the optical head; ~~.~~

~~2. The method for accurately detecting and controlling a position of an optical head of an optical disk according to claim 1,~~ wherein a sector on the storage medium is divided into a control area and a data area, and the control area comprises an x-direction position control unit and a y-direction position control unit.

~~3~~2. The method for accurately detecting and controlling a position of an optical head of an optical disk according to claim ~~2~~1, wherein the holograms are staggered equidistantly in a direction perpendicular to an optical track, the position deviation signal is obtained through a difference in diffracted light intensity of these holograms, and the position of the optical head and the optical disk is controlled accordingly, so that the position deviation signal of the y-direction position control area becomes 0.

~~4~~3. The method for accurately detecting and controlling a position of an optical head of an optical disk according to claim ~~2~~1, wherein the holograms are staggered at a constant interval in a direction of an optical track, the position deviation signal is obtained through a difference in diffracted light intensity of these holograms, and the position of the optical head and the optical disk is controlled accordingly, so that the position deviation signal of the x-direction position control area becomes 0.

~~5~~4. A method for accurately detecting and controlling a reading position of an optical disk for reading data stored in an optical disk as a storage medium, wherein

data units stored in the storage medium comprise position control units, and the method comprises: when reading a target data unit, first detecting whether the reading position is accurate through a position deviation signal formed by a position control unit of the target data unit, and controlling the reading position to an accurate position according to the position deviation signal and then reading data in the data unit; wherein at least a part of data is stored in a shift multiplexing holographic storage mode; the method is used for reading the part of data; the position control units comprises an x-direction position control unit and a y-direction position control unit; the x direction is a shift direction of shift multiplexing holographic storage, and the y direction is perpendicular to the x direction.

~~6~~5. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~5~~4, wherein the position control units are a plurality of patterns staggered in the storage medium; at the accurate position, a light intensity difference of corresponding two patterns or two groups of patterns is 0 or a predetermined value, and the position deviation signal is the light intensity difference of the corresponding two patterns or two groups of patterns on the reading position.

~~7~~6. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~5~~ 4 or ~~6~~5, wherein the data units are sectors, and each sector comprises at least an address area for storing address units, a control area for storing position control units, and a data area for storing data units.

~~8. The method for accurately detecting and controlling a reading position of an optical disk according to any one of claims 5 to 7, wherein at least a part of data is stored in a shift multiplexing holographic storage mode; the method is used for reading this part of data; the position control units comprise an x-direction position control unit and a y-direction position control unit; the x direction is a shift direction~~

~~of shift multiplexing holographic storage, and the y direction is perpendicular to the x direction.~~

~~9~~7. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~8~~4, wherein the accurate position in the y direction is located on ~~a read~~an optical track; on the optical track, a difference in diffracted light intensity of corresponding two patterns or two groups of patterns is 0 or a predetermined value; when the reading position is adjacent to the optical track, the position deviation signal is obtained by comparing the difference in the diffracted light intensity of the two holographic patterns or two groups of holographic patterns, and the reading position is controlled accordingly, so that the position deviation signal in the y direction becomes 0 or the predetermined value.

~~10~~8. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~8 4~~ or ~~9~~7, wherein the position control unit in the y direction divides the plurality of holographic patterns into two groups, which are distributed on both sides of the optical track equidistantly from the optical track, and each group comprises a plurality of holographic patterns arranged equidistantly.

~~11~~9. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~10~~8, wherein the two groups of holographic patterns are staggered in a direction parallel to the optical track, and the staggered distance is a distance d moved in the data area during shift multiplexing.

~~12~~10. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~10 8~~ or ~~11~~9, wherein the holographic patterns are circular, the two groups of holographic patterns are staggered with each other, and the optical track is located on a rotation symmetric center of the staggered area.

~~13~~11. The method for accurately detecting and controlling a reading position of an optical disk according to any one of claims ~~9~~ 7 to ~~12~~10, wherein controlling the reading position refers to controlling the reading position to move up and down in a direction perpendicular to the optical track until the position deviation signal becomes 0~~/predetermined value 0~~ or a predetermined value.

~~14~~12. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~8~~4, wherein the accurate position in the x direction is a position of one of a first point and a second point, which are spaced apart by a distance d moved during shift multiplexing, on an optical axis; a distance between the one of the first and second~~this~~ points and a starting point in the data area is an integer multiple of d; the difference in the diffracted light intensity of the two patterns or two groups of patterns corresponding to ~~these two~~the first and second points is 0 or a predetermined value; when the reading position is adjacent to the first point, the diffracted light intensity of a holographic pattern at that position is read, the distance d is moved in the direction of the second point along the optical axis, the diffracted light intensity of a holographic pattern at a new position is read, the position deviation signal is obtained by comparing the difference in the diffracted light intensity of two holographic patterns or two groups of holographic patterns, and the reading position is controlled accordingly, so that the position deviation signal in the x direction becomes 0 or a predetermined value.

~~15~~13. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~14~~12, wherein the position control unit in the x direction divides the plurality of holographic patterns into two groups, which are arranged alternately and equidistantly along the optical track, and each group comprises a plurality of holographic patterns arranged equidistantly.

~~16~~14. The method for accurately detecting and controlling a reading position of an optical disk according to claim ~~14~~ 12 or ~~15~~13, wherein the holographic patterns are circular, and a distance between the centers of two circular holographic patterns corresponding to the first point and the second point is not equal to d.

~~17~~15. An optical disk, wherein data units stored in the optical disk comprise position control units, wherein at least a part of data is stored in a shift multiplexing holographic storage mode, the position control units include an x-direction position control unit and a y-direction position control unit, the x direction is a shift direction of shift multiplexing holographic storage, and the y direction is perpendicular to the x direction.

~~18~~16. The optical disk according to claim ~~17~~15, wherein the position control units are a plurality of patterns staggered in the optical disk; at the accurate position for aligning and reading the data units, a light intensity difference of corresponding two patterns or two groups of patterns is 0 or a predetermined value.

~~19~~17. A device for accurately detecting and controlling a reading position of an optical disk, comprising:

an optical system, configured to read data on an optical disk;

the optical disk, configured to store position control units; and

a translation stage, configured to support the optical disk in translation;

further comprising a comparator, configured to compare a difference between two position deviation signals or two groups of position deviation signals read by the optical system from the optical disk, and drive the translation stage to support the optical disk in translation according to the difference, until the difference meets a requirement;

wherein the translation stage includes an x-direction translation mechanism and a y-direction translation mechanism, the x-direction translation mechanism is configured

to control the translation stage to support the optical disk in translation in the moving direction of the optical disk for shift multiplexing, and the y-direction translation mechanism is configured to control the translation stage to support the optical disk in translation in the direction perpendicular to the x direction.

~~20~~18. The device according to claim ~~19~~17, wherein the optical system is a reference light system of a holographic storage reading system, and the position deviation signals compared by the comparator are the diffracted light intensity of different patterns at the same position and/or the diffracted light intensity of two patterns spaced apart by a distance moved during holographic storage shift multiplexing.