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Diffraction Experiment of Microscopic Particle Is Due to One Force[1]

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Abstract

It will be considered that microscopic particle does not have wave nature , diffraction experiment of microscopic particle should indirectly and objectively reflect the existence of one force which can lead to particle's diffraction phenomenon , the force belongs to deeper theory under the quantum mechanics , and will be proved that it relates to electrostatic force in this paper .

Introduction

It is a basic judgment that microscopic particle also is wave because which has diffraction phenomenon , the wave of microscopic particle be interpreted as probability wave in Born's paper[2] . Probability Wave means that the states of microcosmic particle can't be accurately predicted and it is only described by probability in theory ; on the contrary , if accurate prediction is demanded in theory[3] , the only way is to assume that microcosmic particle does not have wave nature .

On the one hand , diffraction experiment indicates microcosmic particle with the property of wave ; on the other hand , the theory requires that microcosmic particle does not have wave nature . it is extreme contradiction between experiment and requirements in theory , one way out of the difficulty is to assume that wave nature is not actual for microscopic particle .

The following discussion , It will be proved firstly that diffraction experiment does not demonstrate microcosmic particle with wave nature 100 percent ; Secondly , it will be proved wave phenomenon of microcosmic particle is due to one force .

1 Diffraction Experiment Can't Demonstrate That Microcosmic Particle Has Wave Nature

All wave have diffraction phenomena in classical physics , so it is taken for granted that microcosmic particle also is wave , but no theory directly proves it in fact , also diffraction phenomena of microcosmic particle is not completely equivalent to wave nature , it can be proved by two thought experiments .

Diffraction experiment of microcosmic particle bases on a large number of particles or many experiments of a single particle , imagining a lot of foraging ants on the ground , the distribution of ants must follow the rules that ants abound in the place where food abound , image of ants on the ground is similar to the stripe of diffraction phenomenon (bright area in the place where more ants , dark area in the place where little ants) ; it obeys the law of probability distribution if we use statistical analysis , a higher probability for ants in the place where has food and is closer to food . Ants have diffraction phenomenon and can be described by probability , but we can't think that ants with wave nature of probability , wave phenomenon of ants is due to the "temptation" of food , while wave phenomenon of ants will don't occur once the temptation disappearance , this means that the wave phenomenon of ants reflects the existence of temptation .

It also can be interpreted by another thought experiment , assuming one train with speed of 350 kilometers per hour , people has this speed if we by the train , people has the speed of train but we can't think that people also is train , it can only show that the train has influence on people .

2 Giving the Force and Getting the Energy of Hydrogen Atom

Wave nature of microcosmic particle does not allow obviously in this paper , the only way to understand diffraction phenomenon is that the motion states of particle change regularly when they pass through the diffracting object , the change is due to interaction of one force .

The existence of additional force has indicated in quantum mechanics , quantum potential energy has been proposed in Bohm's paper[4] by analysis Schrodinger equation , it relates to wave function and has the form

$$V=-\frac{\hbar^2}{2m}\frac{\nabla^2\psi}{\psi} \tag{2.1}$$

the potential energy of object be calculated by work in conservation field of force , an object feels the force must be from another object , so quantum potential energy accompanies corresponding force , has

$$f=f\left(\frac{\partial V}{\partial r}\right)=f\left\{-\frac{\hbar^2}{2m}\frac{\partial}{\partial r}\left[\frac{\nabla^2\psi}{\psi}\right]\right\} \tag{2.2}$$

where r is the distance between two particles , the complete force of one particle should has the form

$$F=f\left\{-\frac{\hbar^2}{2m}\frac{\partial}{\partial r}\left[\frac{\nabla^2\psi}{\psi}\right]\right\}+f\left\{\frac{\partial U}{\partial r}\right\} \tag{2.3}$$

where U is the potential which usually has been given in Schrodinger equation .

The force be found in my book *the Handwriting of Quantum* , and has function form

$$F=\frac{D}{A^2}\cdot\frac{2\sin\left(\pi\sqrt{r}/A\right)Si\left(\pi\sqrt{r}/A\right)\left[Si^2\left(\pi\sqrt{r}/A\right)-(\pi/2)^2\right]}{r} \tag{2.4}$$

where $Si(x)=\int_0^x\frac{\sin x}{x}dx$, r is the distance between two research objects , A and D relate to investigate system (where $A>0$) . The force has unique property which forms many potential wells in $r=n^2A^2$ (where $n=1,2,3\ldots$) , in other words : $r=n^2A^2$ is an energy level . particle only has potential energy but has no kinetic energy

if the particle is in the bottom of a well , defining zero potential energy in $r\to\infty$, so potential energy has the form

$$U=-D\left\{Si^2\left(\pi\sqrt{r}/A\right)-(\pi/2)^2\right\}^2/A^2 \tag{2.5}$$

The calculation results show that $U|_{r=n^2A^2}\approx -D/n^2A^2$ (refers to table 1.1) , $U|_{r=n^2A^2}$ also represents the energy of a hydrogen atom when $D/A^2=\dfrac{me^2}{32\hbar^2\varepsilon_0^2}=hcR$, this strongly indicates that F is the direct reason of quantization in microcosmic field .

Table1.1 the calculation of $U|_{r=n^2A^2}$ and $1/n^2A^2$ (where make $A=1$ and $D=1$)

n	0	1	2	3	4	5
$U\|_{r=n^2}$	-6.088068	-0.925963	-0.208162	-0.113856	-0.058011	-0.040982
$-1/n^2$	$-\infty$	-1.000000	-0.250000	-0.111111	-0.062500	-0.040000
n	6	7	8	9	10	11
$U\|_{r=n^2}$	-0.026561	-0.020832	-0.015138	-0.012562	-0.009759	-0.008389
$-1/n^2$	-0.027778	-0.020408	-0.015625	-0.012346	-0.010000	-0.008264
n	12	13	14	15	16	17
$U\|_{r=n^2}$	-0.006809	-0.005995	-0.005018	-0.004497	-0.003851	-0.003497
$-1/n^2$	-0.006944	-0.005917	-0.005102	-0.004444	-0.003906	-0.003460
n	18	19	20	21	22	23
$U\|_{r=n^2}$	-0.003048	-0.002797	-0.002472	-0.002287	-0.002045	-0.001906
$-1/n^2$	-0.003086	-0.002770	-0.002500	-0.002268	-0.002066	-0.001890
n	24	25	26	27	28	29
$U\|_{r=n^2}$	-0.001720	-0.001612	-0.001467	-0.001381	-0.001266	-0.001197
$-1/n^2$	-0.001736	-0.001600	-0.001479	-0.001372	-0.001276	-0.001189
n	30	31	32	33	34	35
$U\|_{r=n^2}$	-0.001103	-0.001047	-0.000970	-0.000924	-0.000860	-0.000821
$-1/n^2$	-0.001111	-0.001041	-0.000977	-0.000918	-0.000865	-0.000816
n	36	37	38	39	...	∞
$U\|_{r=n^2}$	-0.000767	-0.000734	-0.000689	-0.000661	...	0
$-1/n^2$	-0.000772	-0.000730	-0.000693	-0.000657	...	0

3 Electrostatic Force and Gravity Also Have Accurate Form

We stell use the opinion that The potential energy of object calculates by work in conservation field of force , it can be regarded as the work by a constant force $\overline{F}$ when particle from n to $n-1$ energy level , has

$$\overline{F}=\frac{U|_{r=n^2A^2}-U|_{r=(n-1)^2A^2}}{n^2A^2-(n-1)^2A^2}=\frac{-D}{n^4A^4} \tag{3.1}$$

n^2A^2 is similar to continuous change if A^2 is small enough , using continuum variable r instead of n^2A^2 , has

$$\overline{F}=-D/r^2 \tag{3.2}$$

it is strict same with the electrostatic force , so electrostatic force should has more accurate form

$$F=\frac{KQ_1Q_2}{A^2}\frac{2\sin\left(\pi\sqrt{r}/A\right)Si\left(\pi\sqrt{r}/A\right)\left[Si^2\left(\pi\sqrt{r}/A\right)-(\pi/2)^2\right]}{r}, \tag{3.3}$$

where K is the constant of electrostatic force , r is the distance of object 1 and 2 , Q_1 and Q_2 are charge of object 1 and 2 , A is defined as the radius of electrostatic force in here (A is related to investigation system).

I suppose that gravity also has the similar accurate form

$$F=\frac{-GM_1M_2}{A^2}\frac{2\sin\left(\pi\sqrt{r}/B\right)Si\left(\pi\sqrt{r}/B\right)\left[Si^2\left(\pi\sqrt{r}/B\right)-(\pi/2)^2\right]}{r}, \tag{3.4}$$

where G is the constant of gravity , r also is the distance of object 1 and 2 , M_1 and M_2 are mass of object 1 and 2 , B is defined as the radius of gravity in here (B is also related to investigation system).

[1] All opinions of this paper are according to my book *the Handwriting of Quantum* .
ChengGang.Zhang , *the Handwriting of Quantum* , Chengdu : University of Electronic Science and Technology of China Press , ISBN : 9787564723651 .

[2] M.Born , Zeit . Phyik , 38(1926) , 803 .

[3] A.Einstein , B.Podolsky , N.Rosen.Phys.Rev. , 47(1935) , 777 .

[4] D.Bohm.Phys.Rev. , 85(1952) , 166 .