#			A	hwp	В	hwp	Counts	(30 seconds)	±
1	a	b	0	0	22.5	11.25			+
2	$a_{\perp}$	b	90	45	22.5	11.25			-
3	$\boldsymbol{a}$	$oldsymbol{b}_{\perp}$	0	0	112.5	56.25			_
4	$oldsymbol{a}_{\perp}$	$oldsymbol{b}_{\perp}$	90	45	112.5	56.25			+
5	a	<b>b'</b>	0	0	67.5	33.75			+
6	$a_{\perp}$	<i>b</i> ′	90	45	67.5	33.75			_
7	$\boldsymbol{a}$	$m{b'}_{\perp}$	0	0	157.5	78.75			_
8	$oldsymbol{a}_{\perp}$	$m{b'}_{\perp}$	90	45	157.5	78.75			+
9	a'	b'	45	22.5	67.5	33.75			+
10	$a'_{\perp}$	<i>b</i> ′	135	67.5	67.5	33.75			_
11	a'	$m{b'}_{\perp}$	45	22.5	157.5	78.75			_
12	$a'_{\perp}$	$m{b'}_{\perp}$	135	67.5	157.5	78.75			+
13	a'	b	45	22.5	22.5	11.25			+
14	$a'_{\perp}$	b	135	67.5	22.5	11.25			-
15	a'	$oldsymbol{b}_{\perp}$	45	22.5	112.5	56.25			
16	$a'_{\perp}$	$oldsymbol{b}_{\perp}$	135	67.5	112.5	56.25			+

$$X = Ne\left(\frac{1}{r^2} - \frac{r}{R^3}\right) \quad [\text{and}]^1$$

$$V = Ne\left(\frac{1}{r} - \frac{3}{2R} + \frac{r^2}{2R^3}\right).$$

$$X = Ne\left(\frac{1}{r^2} - \frac{r}{R^3}\right)$$

$$V = Ne\left(\frac{1}{r} - \frac{3}{2R} + \frac{r^2}{2R^3}\right).$$

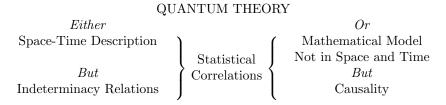


 $<sup>^1[\</sup>text{To determine the electric potential we }integrate \text{ the field strength }X \text{ over }distance \text{ (see Appendix II B, 269-71 below for a discussion of this), from }s=r\text{ to }s=R\text{ (it is not necessary to consider radii greater than }R\text{ because, the atom as a whole being electrically neutral, there is no field beyond }R\text{)}. Thus Rutherford's expression for }V\text{ is the result of having evaluated the integral }\int_r^R Ne(1/s^2-s/R^3)\,ds.]$   $^2[\text{To determine the electric potential we }integrate \text{ the field strength }X\text{ over }distance\text{ (see$ 

 $<sup>^2[</sup>$  To determine the electric potential we integrate the field strength X over distance (see Appendix II B, 269-71 below for a discussion of this), from s=r to s=R (it is not necessary to consider radii greater than R because, the atom as a whole being electrically neutral, there is no field beyond R). Thus Rutherford's expression for V is the result of having evaluated the integral  $\int_r^R Ne(1/s^2-s/R^3)\,ds.]$ 

#			A	hwp	В	hwp	Counts	(30 seconds)	±
1	$\boldsymbol{a}$	$\boldsymbol{b}$	0	0	22.5	11.25			+
2	$\boldsymbol{a}_{\perp}$	$\boldsymbol{b}$	90	45	22.5	11.25			_
3	$\boldsymbol{a}$	$\boldsymbol{b}_{\perp}$	0	0	112.5	56.25			_
4	$oldsymbol{a}_{\perp}$	$\boldsymbol{b}_{\perp}$	90	45	112.5	56.25			+
5	$\boldsymbol{a}$	b'	0	0	67.5	33.75			+
6	$\boldsymbol{a}_{\perp}$	b'	90	45	67.5	33.75			_
7	$\boldsymbol{a}$	$\boldsymbol{b'}_{\perp}$	0	0	157.5	78.75			_
8	$oldsymbol{a}_{\perp}$	$m{b'}_{\perp}$	90	45	157.5	78.75			+
9	a'	b'	45	22.5	67.5	33.75			+
10	$\boldsymbol{a'}_{\perp}$	b'	135	67.5	67.5	33.75			_
11	a'	${\boldsymbol{b'}_\perp}$	45	22.5	157.5	78.75			_
12	$\boldsymbol{a'}_{\perp}$	$m{b'}_{\perp}$	135	67.5	157.5	78.75			+
13	a'	b	45	22.5	22.5	11.25			+
14	$\boldsymbol{a'}_{\perp}$	$\boldsymbol{b}$	135	67.5	22.5	11.25			_
15	a'	$\boldsymbol{b}_{\perp}$	45	22.5	112.5	56.25			_
16	$m{a'}_{\perp}$	$oldsymbol{b}_{\perp}$	135	67.5	112.5	56.25			+

## CLASSICAL THEORY Space-Time Description [and] Causality



## CLASSICAL THEORY Space-Time Description [and] Causality

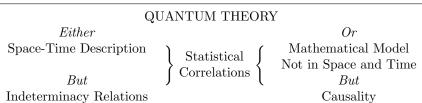


TABLE  $VI^a$ 

$t_g$ Sec.	$t_F$ Sec.	$\frac{1}{t_F}$	$\frac{1}{t_F'} - \frac{1}{t_F}$	n'	$\frac{1}{n'} \left( \frac{1}{t_F'} - \frac{1}{t_F} \right)$	$\frac{1}{t_g} + \frac{1}{t_F}$	n	$\frac{1}{n}(\frac{1}{t_g} + \frac{1}{t_F})$
11.848	80.708	.01236				.09655	18	.005366
11.890	22.366	}	.03234	6	.005390			
11.908	22.390	.04470 {				.12887	24	.005371
11.904	22.368	}	.03751	7	.005358			
11.882	140.565	.007192				.09138	17	.005375
		}	.005348	1	.005348			
11.906	79.600	.01254 {				.09673	18	.005374
11.838	34.748	}	.01616	3	.005387			
11.816	34.762	.02870				.11289	21	.005376
11.776	34.846							
11.840	29.286							
	}	.03414				.11833	22	.005379
11.904	29.236	}	.026872	5	.005375			
11.870	137.308	.007268 {				.09146	17	.005380
		}	.021572	4	.005393			
11.952	34.638	.02884 {				.11303	21	.005382
11.860		}	.01623	3	.005410			
11.846	22.104							
	}	.04507 {		_		.12926	24	.005386
11.912	22.268	}	.04307	8	.005384			
11.910	500.1	.002000				.08619	16	.005387
11.918	19.704	05050	.04879	9	.005421	10100		007000
44.000	10.000	.05079				.13498	25	.005399
11.870	19.668		00[=0]4	_	00 - 100			
11 000	77.400		.03[79]4	7	.0054[20]			
11.888	77.630	01005				00704	1.0	005000
11 004	77.906	.01285 {	01070	2	005205	.09704	18	.005390
11.894	77.806 <sup>)</sup> 42.302	.02364	.01079	4	.005395	10799	20	005202
11.878	42.302	.02304 /				.10783	20	.005392
11.880			Means		.005386			.005384

Duration of exp.	=45 min.	Pressure	= 75.62  cm.				
Plate distance	= 16  mm.	Oil density	= .9199				
Fall distance	= 10.21  mm.	Air viscosity	$= 1,824 \times 10^{-7}$ [poise]				
Initial volts	= 5,088.8	Radius $(a)$	= .[0]000276  cm.				
Final volts	= 5,081.2	$\frac{l}{a}$ [mean free path $\div a$ ]	= .034				
Temperature	= 22.82°C.	Speed of fall	= .08584 cm./sec.				
$e_i = 4.991 \times 10^{-10} \text{ [statcoulomb]}^b$							

 $<sup>^</sup>a[$  The bracketed numbers are our corrections of errors in the original paper.]  $^b[$  The value presently accepted is  $4.802\times10^{-10}$  stateoulombs.]