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Really Stable versus Conditionally Stable Argon

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Abstract: *In the light of double surface concept the overall orbit determines the stability of Argon.*

Keywords: *Argon, Bohr-like orbit length, double surface stability, individual orbit and overall orbit link*

1. Introduction

The subject of interest of this paper is to examine the stability of Argon in the light of double surface concept.

2. Bohr-Like Orbit

The effective nuclear charge $Z_{effective}$[1]can be attributed to each atomic orbital as well as Bohr-like orbit length may be assigned to each effective nuclear charge. Expressing the orbit length in Compton wavelengths of the electron we have[2]:

$$s_{Bohr-like} = \frac{\alpha^{-1}}{Z_{effective}}. \tag{1}$$

Where α^{-1} denotes the inverse fine structure constant and $Z_{effective}$ denotes the effective nuclear charge.

3. The Double Surface Orbit

Respecting the double surface concept [1]the length of stable Bohr-like orbit expressed in Compton wavelengths of the electron is the average elliptic-hyperbolic length $s_n$determined by the elliptic length $n \in \mathbb{N}$ of that orbit as follows:

$$s_n = n\left(2 - \frac{1}{\sqrt{1+\frac{\pi^2}{n^2}}}\right), n \in \mathbb{N}. \tag{2}$$

The elliptic length n being the natural number is at the same time the name of stable Bohr-like orbit.

4. The Knotted Bohr-Like Orbit

Bohr-like orbit is in principle unstable. At the constant energy it can improve its stability by knotting where the orbit length $s_{Bohr-like}$is at constant energy multiplied by factor $m \in \mathbb{N}$. To become completetly stable by the criteria of double surface concept the multiplied orbit length $m.s_{Bohr-like}$ should be further modified (shortened or extended) to $s_{n\in\mathbb{N}}$with the help of energy change (released or consumed energy, respectively) as follows:

$$\Delta E = Ry.\alpha^{-1}\left(\frac{1}{(m \in \mathbb{N}).s_{Bohr-like}} - \frac{1}{s_{n\in\mathbb{N}}}\right) \gtrless 0. \tag{3a}$$

Where $Ry = 13.6\ eV$denotes Rydberg constant and $\alpha^{-1} = 137.036$ denotes the inverse fine structure constant.

For conditionally stable Bohr-like orbit the missing energy should be consumed:

$$\Delta E > 0. \tag{3b}$$

And for really stable Bohr-like orbit the exceeding energy should be released:

$$\Delta E < 0. \tag{3c}$$

In such a way (3b or 3c) all orbits can be given and linked in the overall orbit as their sum.

Bohr-like orbit is taken to be knotted in the case of being multiplied by natural factor $m > 2$. Being multiplied by factor $m = 2$ it is only linked but remained unknotted. And of course being multiplied by factor $m = 1$it remains unknotted, too.

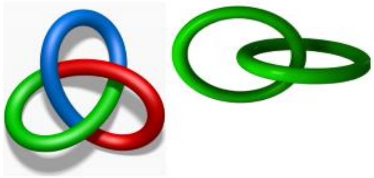

Figure1. *An example of Knot(m=3) and linked Unknot(m=2)*

5. The Conditionally Stable Argon

According to the previouslly mentioned criteria (see chapter 4) nine really stable individual Bohr-like orbits and a conditionally stable overall Bohr-like orbit link of Argon are given as being presented in Table1.

Table1. *Unknotted (m<3)reallystable individual Bohr-like orbitsversusconditionally stable overall Bohr-like orbit link ofArgon*

Orbital	Effective nuclear charge ($Z_{effective}$)	Orbit length (s) in λ_e	Unknot multiple (m)	Unknot length (ms) in λ_e	Stable unknot length (s_n) in λ_e	Length difference (Δs) in λ_e	Energy difference (ΔE) in eV	Frequency equivalent (ν)
1s	17,5075	7,827274	1	7,827274	7,613682	0,2136	-6,68	
2s	12,23	11,20491	2	22,40981	22,22093	0,1889	-0,71	
2p	14,008	9,782696	1	9,782696	9,502803	0,2799	-5,61	
2p	14,008	9,782696	1	9,782696	9,502803	0,2799	-5,61	
2p	14,008	9,782696	1	9,782696	9,502803	0,2799	-5,61	
3s	7,7568	17,66656	1	17,66656	17,28305	0,3835	-2,34	
3p	6,7641	20,25931	1	20,25931	20,24227	0,0170	-0,08	
3p	6,7641	20,25931	1	20,25931	20,24227	0,0170	-0,08	
3p	6,7641	20,25931	1	20,25931	20,24227	0,0170	-0,08	
Overall link		**126,8248**		**138,0297**	**138,0357**	**-0,0061**	**0,0006**	**0,14 THz**

Above – let us say confederal – arrangment of Argon orbits offers a partial benefit to all constituents since at the formation of each individual orbit the energy is realesed. So all nine unknotted orbits ($m < 3$) are stable.But unfortunatelly the overall orbit link is only conditionally stable since for its formation the infut of energy is needed(3b) with the help of photon of 0.14 THz. Thus, such confederation of orbits offering only a conditionally stable overall link is considered to be less favourable.

6. The Really Stable Argon

On the other hand the really stable overall orbit can be given according to the previouslly mentioned criteria in the chapter 4 on the account of the only one really stable individual and eight conditionally stable individual Bohr-like orbits of Argon as being presented in Table2.

Table2. *One really stable and eight conditionally stable knotted (m>2) individual Bohr-like orbits versus really stable overall Bohr-like orbit link of Argon*

Orbital	Effective nuclear charge ($Z_{effective}$)	Orbit length (s) in λ_e	Knot multiple (m)	Unknot length (ms) in λ_e	Stable knot length (s_n) in λ_e	Length difference (Δs) in λ_e	Energy difference (ΔE) in eV	Frequency equivalent (ν)
1s	17,5075	7,827274	5	39,13637	39,12592	0,0105	-0,0127	-3,07 THz

2s	12,23	11,20491	5	56,02453	56,08791	-0,063	0,0376	
2p	14,008	9,782696	5	48,91348	49,10040	-0,187	0,1450	
2p	14,008	9,782696	5	48,91348	49,10040	-0,187	0,1450	
2p	14,008	9,782696	5	48,91348	49,10040	-0,187	0,1450	
3s	7,7568	17,66656	3	52,99969	53,09286	-0,093	0,0617	
3p	6,7641	20,25931	4	81,03724	81,06085	-0,024	0,0067	
3p	6,7641	20,25931	4	81,03724	81,06085	-0,024	0,0067	
3p	6,7641	20,25931	4	81,03724	81,06085	-0,024	0,0067	
Overall link		126,8248		538,0128	538,0092	0,0036	-2,317 10^{-5}	-5,60 GHz

Above – let us say federal – arrangment of Argon orbits offers real stability to overall link since at its information the energy is released (3c) in the form of 5.60 GHz photon. On the first side of view only the first orbit would become more stable on its own with the release of stronger 3.08 THz photon. But unfortunatelly only for while since the stability of each individual orbit depends on the overall link stability which should not be wasted because of an individual orbit irresponsibility. Thus, such federation of orbits offering a really stable overall link is considered to be more favourable.

7. Conclusion

For growing up every link is important.

Figure2. *Growing up*

Dedication

To everyman (applies to both sexes)

Addendum: Krypton choice

According to the theory just presented, the stability of Krypton, the next noble atom, can be considered. Indeed, Krypton choice is either the stable unknotted or the stable knotted overall Bohr-like orbit link. The first is presented in Table3 and the second in Table4.

Table3. *The stable unknotted overall Krypton link*

Orbital	Effective nuclear charge ($Z_{effective}$)	Orbit length (s) in λ_e	Unknot multiple (m)	Unknot length (ms) in λ_e	Stable unknot length (s_n) in λ_e	Length difference (Δs) in λ_e	Energy difference (ΔE) in eV	Frequency equivalent (ν)
1s	35.2316	3.889577	1	3.889577	3.928137	-0.0385	> 0	
2s	26.398	5.191151	1	5.191151	5.766335	-0.5752	> 0	
2p	32.047	4.276095	1	4.276095	4.854244	-0.5781	> 0	
2p	32.047	4.276095	1	4.276095	4.854244	-0.5781	> 0	
2p	32.047	4.276095	1	4.276095	4.854244	-0.5781	> 0	
3s	21.033	6.515286	1	6.515286	6.684550	-0.1693	> 0	
3p	**20.434**	**6.706274**	2	**13.41255**	**13.36374**	**0.0488**	**-0.5075**	**-122.7 THz**
3p	**20.434**	**6.706274**	2	**13.41255**	**13.36374**	**0.0488**	**-0.5075**	**-122.7 THz**
3p	**20.434**	**6.706274**	2	**13.41255**	**13.36374**	**0.0488**	**-0.5075**	**-**

								122.7THz
4s	11.316	12.10993	1	12.10993	12.39123	-0.2813	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
4p	9.7692	14.02735	1	14.02735	14.33971	-0.3124	> 0	
4p	9.7692	14.02735	1	14.02735	14.33971	-0.3124	> 0	
4p	9.7692	14.02735	1	14.02735	14.33971	-0.3124	> 0	
Overall link		**135.9543**		**156.0732**	**156.0316**	**0.0415**	**-0.0032**	**-0.77 THz**

Table4. *The stable knotted overall Krypton link*

Orbital	Effective nuclear charge ($Z_{effective}$)	Orbit length (s) in λ_e	Knot multiple (m)	Knot length (ms) in λ_e	Stable knot length (s_n) in λ_e	Length difference (Δs) in λ_e	Energy difference (ΔE) in eV	Frequency equivalent (ν)
1s	35.2316	3.889577	8	31.11661	31.15797	-0.0414	> 0	
2s	26.398	5.191151	2	10.38230	10.45972	-0.0774	> 0	
2p	32.047	4.276095	2	8.552189	8.553588	-0.0014	> 0	
2p	32.047	4.276095	2	8.552189	8.553588	-0.0014	> 0	
2p	32.047	4.276095	2	8.552189	8.553588	-0.0014	> 0	
3s	21.033	6.515286	6	39.09171	39.14766	-0.0559	> 0	
3p	20.434	6.706274	10	67.06274	67.07353	-0.0108	> 0	
3p	20.434	6.706274	10	67.06274	67.07353	-0.0108	> 0	
3p	20.434	6.706274	10	67.06274	67.07353	-0.0108	> 0	
4s	11.316	12.10993	1	12.10993	12.39123	-0.2813	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
3d	20.626	6.643848	1	6.643848	6.684550	-0.0407	> 0	
4p	9.7692	14.02735	3	42.08206	42.11700	-0.0349	> 0	
4p	9.7692	14.02735	3	42.08206	42.11700	-0.0349	> 0	
4p	9.7692	14.02735	3	42.08206	42.11700	-0.0349	> 0	
Overall link		**135.9543**		**479.01076**	**479.01030**	**0.00046**	**-3.7410^{-6}**	**-0.90 GHz**

The stable unknotted Krypton orbit link is energetically more favourable than the knotted one but at the same time more risky, too. At the formation of the former a stronger foton is released (0.77THz >0.90 GHz) but still stronger foton of 122.7 THz could be released at the formation of an independent 3p-orbit which would destabilize the overall orbit.

References

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