***Unbounded Dimension***

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1D | 2D | 3D |
| **1D** | **A red and blue circle  Description automatically generated**1D-Box/Wire |  |  |
| **2D**  ***Total Dimension*** | 2D-Wire | 2D-Box |  |
| **3D** | 3D-Wire | 3D-Thin Film | An orange cube with a white background  Description automatically generated3D-Box |

**A red and blue circle

Description automatically generated1D-Box Ideal Bose Gas**

* , *,* ,

**Important Equations**

* *(eq. 1)*
* *(eq. 2)*
* *(eq. 3)*

|  |
| --- |
| *(Using eq. 1)* |

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| --- |
| *(Using eq. 1)* |

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| --- |
| *(Replacing N with polylogarithm form and using eq. 2 for n= in integral ) :* |

|  |
| --- |
|  |

|  |
| --- |
| *= (Using eq. 3)*  *= (Integration by parts)*  *= (Using eq. 1)*  *= (Using eq. 3)*  *= (Integration by parts)*  *= (Using eq. 1)*  *= (Using eq. 3)*  *=*  *= (Using eq. 1)*  ***By Combining All of Them:*** |

**2D-Wire Ideal Bose Gas**

* , *,*
* ,
* *, ,*

**Important Equations**

* *(eq. 4)*
* *(eq. 5)*
* *(eq. 6)*

|  |
| --- |
| *(Using eq. 1)* |

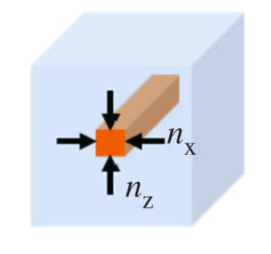
|  |
| --- |
| *(Using eq. 1)* |

|  |
| --- |
| (Replacing N with polylogarithm form and using eq. 2 for n= in integral ) : |

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|  |

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| ***=***        ***By Combining All of Them:*** |

**3D Wire Ideal Bose Gas**



* , *,*
* , ,
* *, ,*

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**d-Dimensional Thermodynamics Using Grand Partition**

**Partition Function with integral and zero correction approximation:**

* , d=dimension
* **(Without zero correction!)**
* **Using Zero Correction to Integral and using eq. 7 for d-dimension:**

* *(eq. 8)*

**2D-Box Ideal Bose Gas**

* , *,*
* ,
* *,*

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| --- |
| *(Using eq. 7-8)*  *, d=2* |

|  |
| --- |
| *,*    *d=2* |

|  |
| --- |
| *, d=2* |

|  |
| --- |
|  |

|  |
| --- |
| *, d=2* |

A diagram of a layer of a layer

Description automatically generated**3D Thin Film Ideal Bose Gas (Not Finished)**

* , *,*
* , ,
* *, ,*

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| *(2D Box integral ) (1D box integrals)* |

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An orange cube with a white background

Description automatically generated**3D-Box Ideal Bose Gas (Not Finished)**

* , *,*
* ,
* *,*

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| *, d=3* |

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| --- |
| *, d=3* |

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| --- |
| *, d=3* |

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| --- |
| *, d=3* |