Light pollution

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PART ONE

Principle and Phenomenon

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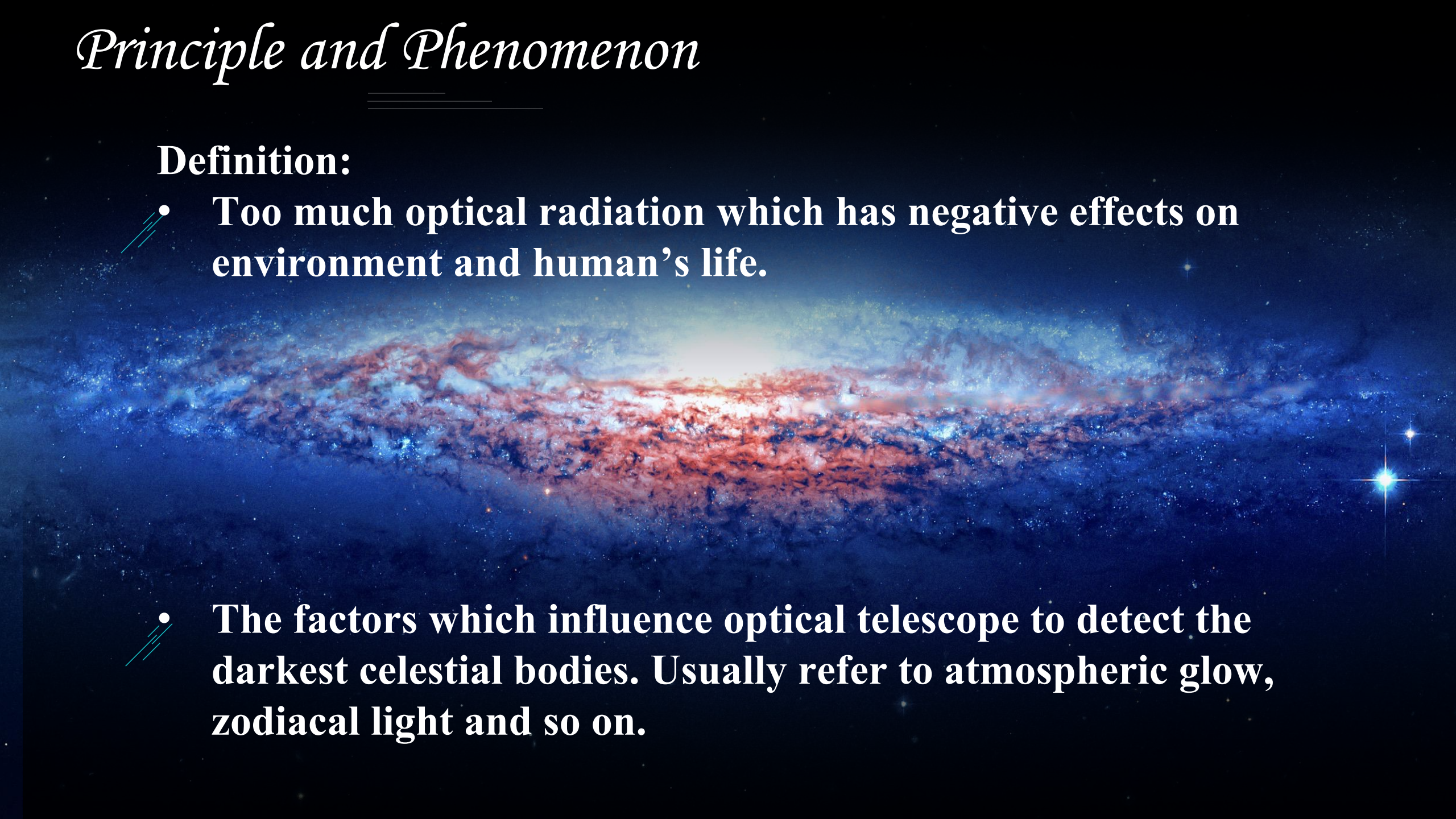
Definition:

- **Too much optical radiation which has negative effects on environment and human's life.**

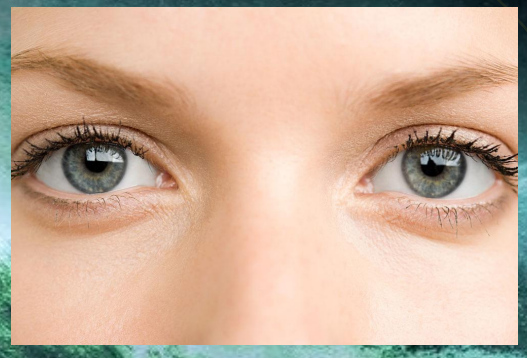


- **The factors which influence optical telescope to detect the darkest celestial bodies. Usually refer to atmospheric glow, zodiacal light and so on.**

- Ultraviolet(紫外线)
- Infrared(红外线)
- Visible light

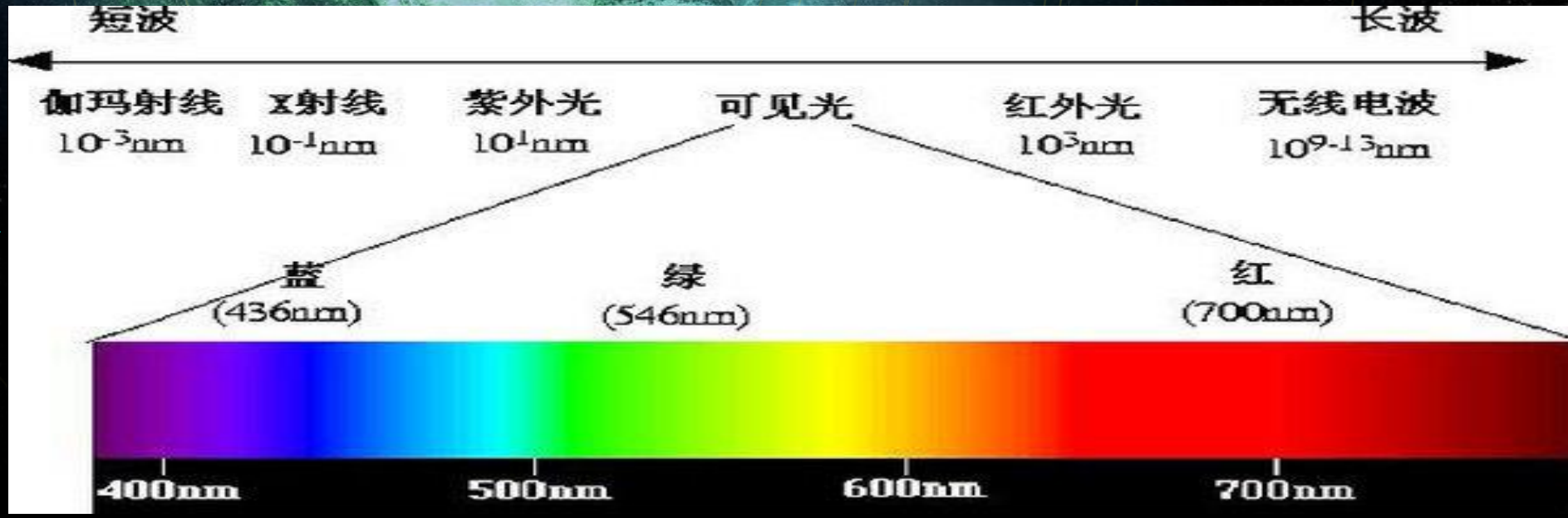
adapt to the optical radiation within certain range

pupil
(瞳孔）



causes negative effects on health

The optical radiation increases too high



white light pollution(白亮污染）

glass curtain wall(玻璃幕墙）

coating material（涂料）

marble （大理石）

vision will decline rapidly

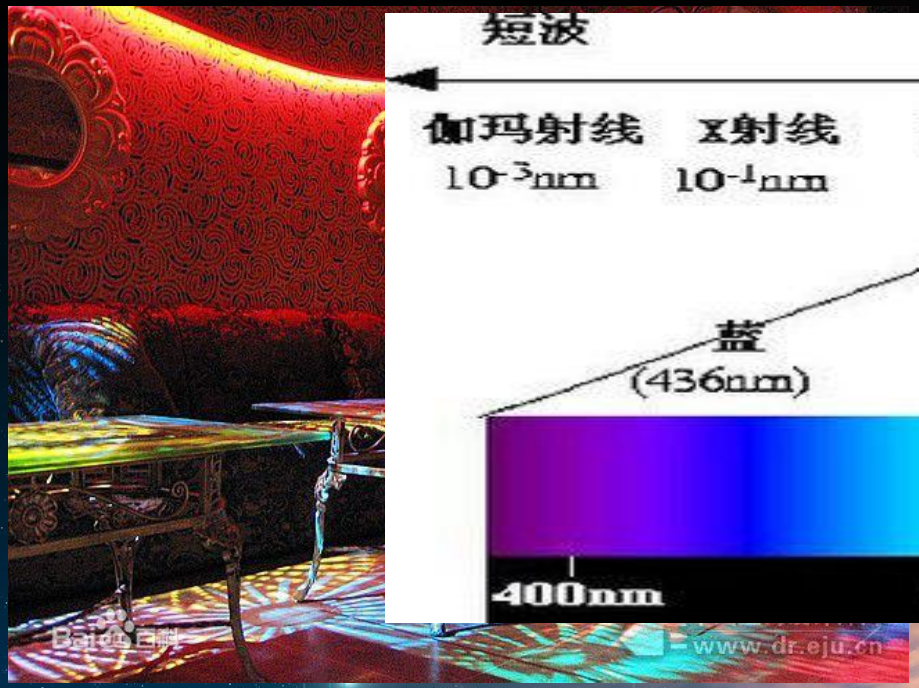
the temperature will rise

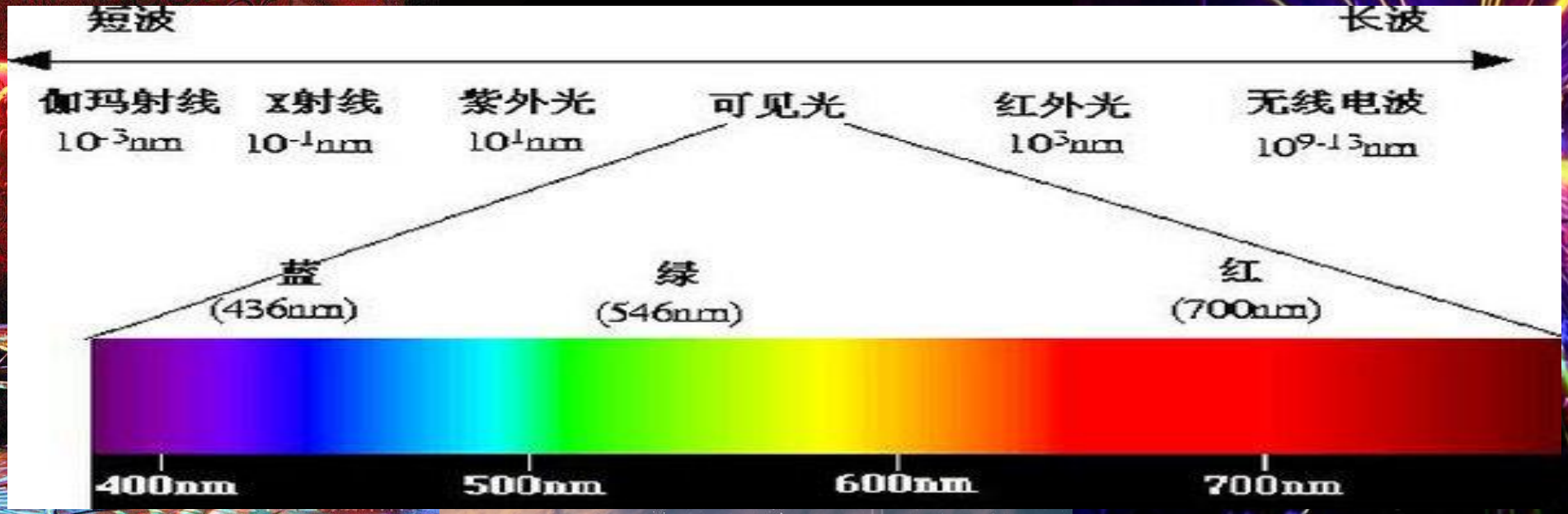
artificial daytime(人工白昼）

the city that never sleep

biological clock

starts





colour light pollution(彩光污染）

KTV

central nervous system(神经中枢）

ballroom(舞厅）

ultraviolet ray(紫外线）

dizzy

instead

PART TWO

reasons

Over-illumination

Not using timers, occupancy sensors or other controls to extinguish lighting when not needed;

Improper selection of hardware to utilize more energy than needed;

Inadequate lighting maintenance

Improper design, especially of workplace spaces, by specifying higher levels of light than needed for a given task;

Incorrect choice of fixtures or light bulbs;

Incomplete training of building managers and occupants to use lighting systems efficiently;

Reasons

light trespass

strong lights enter the window of one's home from the outside..

Skyglow

the overuse of white light sources such as white LEDs.

Light clutter

the street lights are badly designed;where brightly lit advertising surrounds the roadways.

Disability glare

being blinded by oncoming car lights, or light scattering in fog or in the eye, as well as reflections from print and other dark areas that render them bright.

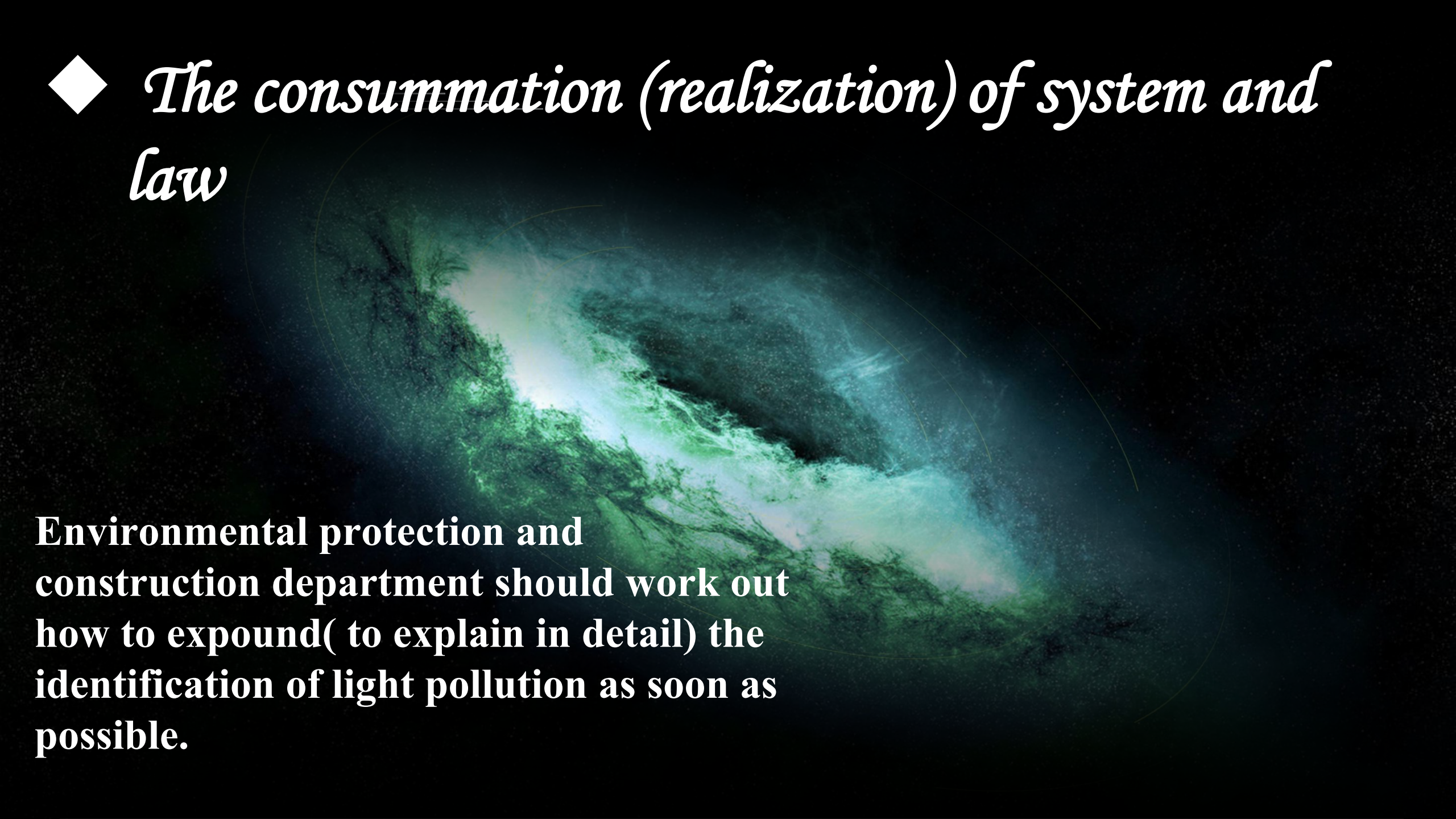
PART THREE

Controlling Measures

Controlling Measures

Now relevant technologies do not yet permit to get rid of the light Pollution totally by means such as decomposition(分解) and transformation the light, so we should in line with an emphasis on prevention first.

◆ *The consummation (realization) of system and law*



Environmental protection and construction department should work out how to expound(to explain in detail) the identification of light pollution as soon as possible.

◆Reduction

Reducing light pollution implies many things, such as reducing sky glow(人工白昼), reducing glare(a bright unpleasant light which hurts eyes), reducing light trespass(擅自进入), and reducing clutter（杂乱). The method for best reducing light pollution, therefore, depends on exactly what the problem is in any given instance. Possible solutions include:

- Utilizing(利用) light sources of minimum intensity（强度） necessary to accomplish the light's purpose.
- Turning lights off using a timer or occupancy sensor or manually(手动关闭) when not needed.

1. Voice-activated sensor light
2. LED light controlled lamps

•Improving lighting fixtures(固定装置), so that they direct their light more accurately towards where it is needed, and with fewer side effects.

•Adjusting the *type* of lights used, so that the light waves emitted(发出的) are those that are less likely to cause severe light pollution problems.

Mercury（汞）, metal halide （金属卤素灯）and above all first generation of blue-light LED road luminaires(光源) are much more pollutant than sodium lamps（钠灯）: Earth atmosphere scatters and transmits blue light better than yellow or red light.

It is a common experience observing "glare" and "fog" around and below LED road luminaires as soon as air humidity（湿度） increases, while orange sodium lamp luminaires are less prone(易于) to show this phenomenon.

5.1 对道路光污染的防治建议

5.2 对广场灯光污染的防治建议

5.3 对社区光污染的防治建议

5.1 对道路光污染的防治建议

（1）加强城市玻璃幕墙的建设管理。一是，希望建筑、环保等部门尽快研究出光污染的鉴定方法，制定出相应的法律法规，依法管理；二是，在城市人群密集的地段及交通主干道两侧和居民区内应尽量少采用玻璃幕墙，特别是在十字交通路口、T字路口、繁华地段不宜采用玻璃幕墙，减少因光污染引起的交通事故；三是，对已建成的玻璃幕墙表面进行化学处理，降低其光的反射率，使光污染减少到最低限度。如降低表面光洁程度或镀膜、加色等；四是，充分发挥高科技优势，使用低反射率幕墙玻璃，如采用的Low-E型低反射玻璃、微晶玻璃、茶色玻璃（反射率为11%）、宝石蓝色玻璃（反射率为12%）等。

（2）对于汽车的散射灯光，在正常天气和保证行车安全的前提下，汽车灯光开中等或中等以下亮度，适量地减少光污染给行车安全带来的不利影响；在汽车、摩托车等车辆的前灯安装遮光罩，遮挡灯光向上和左右方向散射的光，使车灯的光污染大大减少，并能使灯光更加集中在前方的路面上。

（3）大力宣传道路照明是功能性照明的观点，走出路灯造型重美观轻功能的误区，必须坚持以功能性为主，装饰性为辅的原则；紧抓路灯的节能建设，提倡使用节能灯，降低能源浪费。

5.2 对广场灯光污染的防治建议

（1）提倡环保照明和绿色照明，既为人们的工作和生活提供足够的人工光亮，同时为动植物及生态环境留下足够的黑暗空间，使照明与自然夜空相和谐；适当降低闹市区霓虹灯的亮度和转换变化的速度；既要照明充分，又不能照亮过度，注意节约能源，重视照明效果减少夜间对植物的彩光投射。

（2）对于广场上的广告大屏幕光污染，希望录制影视剧、广告画面的专业人员尽量放慢切换画面的节奏，使画面的光亮度更加柔和；呼吁广告屏幕提高设计标准、改善制作质量，设计时合理选择光源、屏幕和亮灯方案，尽量使用光束发散角小的屏幕，并在屏幕上采取加遮光罩或隔片的措施。

广告照明画面内容要做到亮度分配合理，过强的光照，不仅浪费能源和资金，还会产生眩光。

5.3 对社区光污染的防治建议

（1）夜间适当关闭电影院、广场、广告牌等的照明，减少过度照明；街灯尽量避免安装在住户窗前，应隔有一定的距离，防止路灯灯光射入居民室内、干扰居民休息。在CIE22届专题讨论会上，澳大利亚提出对于控制光污染的光度参数最大值的建议，得到了与会者赞同。

（2）玻璃幕墙、马赛克及釉面砖外墙尽量减少直接面向居民区；住宅区不用反光、反热性强的建筑材料，因为它会直接危害到人们的生活健康。居住建筑窗户上的照度和室内直接看到发光体（光源或灯具）的光强不得超过如表4所示的规定值。

总的来说，防治城市光污染，建设低碳城市要做到以下几个方面：（1）提高防治光污染和低碳的意识，要把人性化、生态化、环境化的理念融入到城市建设中；（2）建立和健全法律规范。政府应制定光污染鉴定标准，采用经济手段加以监管和调控，落实“谁制造光污染，谁承担责任”；（3）在保证城市照明、保障人身财产安全和充分考虑生态环境因素等方面的前提下，对照明灯具配光、安装位置、透光角度应进行优化设计；（4）监督灯具开发制造部门树立生态、环保、节能的理念，开发新光源和新灯具，提高灯具的光效和寿命，避免能源浪费，践行低碳理念；（5）在光污染比较严重的地区，更换调整光源的同时可以多植树种花，树木能减少光污染的强度，从而减少对人体的影响和危害。防治光污染、保障城市的光环境健康是“城市环保”、建设低碳城市中非常重要的一部分内容。


THANK YOU