# Characterising the Aurora

The aurora are the result of light generated by ionisation in the upper atmosphere caused by electrons from the sun injected into the Earth's magnetosphere. The aurora can occur at an altitude of 70 to 600 km, but most aurora occur from 100 to 300 km. They may be observed from the ground or from space.

*Photo: John Hicks - New Forest Solar Observatory*

**AURORAL FORM CLASSIFICATION**

| **Shape** | **Structure** |
|---|---|
| A - *arc* | D - *diffuse* |
| B - *band* | F - *glowing* |
| C - *corona* | H - *homogeneous* |
| D - *drapery* | P - *pulsating* |
| G - *glow* | R - *rayed* |
| R - *ray(s)* | |
| S - *surface* | |

The aurora is an extremely variable phenomenon and occurs in a wide variety of forms. Ground observers use single letters to first specify shape and structure. These descriptors are fairly self-explanatory.

Both the shape and the form descriptors are then combined to describe a specific auroral form. An atlas of auroral forms is a great help in serious auroral observing.

**Forms**

HA - *homogenous arc*
RB - *rayed bands*
PA - *pulsating arcs*
FC - *glowing corona*

A ground observer will also specify the brightness of an aurora either by measurement with a photometer (the unit used is the “Rayleigh”), or more frequently by estimation according to the table below. A satellite can also be used to measure the integrated brightness or activity of the aurora by measuring the electron power input to the polar region. The brightness of an aurora is proportional to the precipitating electron flux (with energy < 10 keV), which may be up to $10^{17}$ electrons per square meter per second for a very bright aurora. The power associated with this flux is measured in gigawatts according to the table below.

**AURORAL BRIGHTNESS**

| IBC | kiloRayleigh | Description |
|---|---|---|
| I | 1 | *Faint, brightness of milky way. No colour apparent.* |
| II | 10 | *Brightness of thin moonlit cirrus cloud.* |
| III | 100 | *Brightness of moonlit cumulus cloud* |
| IV | 1000 | *Bright as the full moon. Casts shadows. Very rare.* |

IBC = International Brightness Coefficient

| Activity Index | Power (GW) |
|---|---|
| 1 | <2.5 |
| 2 | 2.5 - 4 |
| 3 | 4 - 6 |
| 4 | 6 - 10 |
| 5 | 10 - 16 |
| 6 | 16 - 24 |
| 7 | 24 - 39 |
| 8 | 39 - 61 |
| 9 | 61 - 96 |
| 10 | >96 |

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