



## **Different states of the transient luminous phenomena in Hessdalen valley, Norway.**

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The transient luminous phenomena's in Hessdalen valley has at least been observed for 200 years, since 1811, when the priest Jacob T. Krogh did the first written documentation. The valley is located in the middle of Norway, isolated and with sub arctic climate. The former mining district has no more than 140 inhabitants, and the deep mines are closed and filled with water. The valley has been under scientific surveillance since 1998 when the first automated and remote controlled observatory was put into action. Today a Norwegian, Italian and French collaboration runs 3 different research stations inside the valley. Each year a scientific field campaign establishes 4 temporary bases in the mountains, and up to 100 students and researchers man these bases for up to 14 days in september when the moon is down.

The Hessdalen phenomena is not easy to detect, and approximately only 20 observations is done each year. The work done the last 14 years suggests that the phenomenon has different states, at least 6 detected so far. The states are so different that to se a coupling between them is difficult. New work done into dusty plasma physics suggest that the different phenomena's may be of the same origin, since the ionized grains of dusty plasma can change states from weakly coupled (gaseous) to crystalline, altering shape/formation and leading to different phenomena. Optical spectrometry from 2007 suggested that the luminous phenomena consisted of burning air and dust from the valley. Work done by G.S Paiva and C.A Taft suggests that radon decay from closed mines may be the mechanism that ionizes dust and triggers this phenomena. The 6 different main states of the Hessdalen phenomena, Doublet, Fireball, Plasma ray, Dust cloud, Flash and Invisible state is described and discussed. Investigation of the atmosphere inside the Hessdalen valley with low frequency directional RADAR, reveals large areas of ionized matter, giving a reflecting area big enough to saturate the input of the radar receiver. Together with long living time, ground analysis and radio active measurements, do not support the radon decay theory, and other forms of ionizing mechanisms must be investigated. The phenomenon's energy source is still not revealed, and the question of internal or external power source is also unexplained.