Laser energy storage discharge circuit

What type of discharge circuit is used for laser flashlamps?
Energy stored in the capacitor. Two types of capacitor discharge circuits are used for laser flashlamps. They are the RLC discharge circuitand pulse-forming network (PFN). The choice of circuit to be used for a particular application depends upon required pulse length,pulse shape,energy to be discharged,and desired charging voltage.

Where is energy stored in a laser network?
Energy is stored in the capacitorof the network. When the laser is fired,an RLC circuit is formed in which the resistance is the resistance of the gas discharge. The inductor is chosen for the best energy transfer from the capacitor to the flashlamp or laser tube.

Does a short plasma lifetime limit the length of a laser-guided discharge?
Scientific Reports 7,Article number: 40063 (2017) Cite this article Recent works on plasma channels produced during the propagation of ultrashort and intense laser pulses in air demonstrated the guiding of electric discharges along the laser path. However,the short plasma lifetime limits the length of the laser-guided discharge.

What is energy storage & pulse-shaping section?
The energy-storage and pulse-shaping section is composed of inductors and capacitors. Capacitors store the energy,the lamp provides the load resistance for the RLC discharge circuit,and the inductors shape the output current pulse.

How does a RLC discharge circuit work?
Capacitors store the energy, the lamp provides the load resistance for the RLC discharge circuit, and the inductors shape the output current pulse. RLC discharge circuits are used for short pulse durations and are designed to be critically damped or slightly overdamped.

How does high excitation temperature affect a laser-guided AC discharge?
The high excitation temperature of air after the laser-guided AC discharge induced a hydrodynamic expansionalong the laser path and produced a conductive channel with an air density 16 times lower than for ambient conditions.

Figure 2 shows the dependence of the laser output energy on the mixed gas pressure. The maximum output energy of the direct-drive circuit was 47.2 mJ, which was almost the same as that of the capacitor-transfer circuit. Figures 3 and 4 show the discharge voltage and laser pulse waveforms at a mixed gas

DISCHARGE CIRCUITS A flash-lamp discharge circuit comprises a trigger circuit to initiate the ionization of the gas in the lamp, a simmer circuit that keeps a partial steady-state ion-ization of the gas, and a charged

capacitor C which is discharged into the flash-lamp through an inductor L [9]. Figure 1 depicts single mesh (Fig. 1a) and multi-

Waveforms of currents in the circuit of storage capacitor I 1 and load current I 2, ... (DF) laser energy and discharge stability in different excitation modes [32], [33]. In the case of excimer lasers output energy with additional X-ray illumination with the use of the IES was maximal, as well. Second reason of discharge improvement with the ...

This review provides a comprehensive overview of the progress in light-material interactions (LMIs), focusing on lasers and flash lights for energy conversion and storage applications. We discuss intricate LMI parameters such as light sources, interaction time, and fluence to elucidate their importance in material processing. In addition, this study covers ...

An X-ray preionized 0: 7l active volume discharge- pumped XeCl laser is described. A simple CLC resonant charging pumping scheme has been used. A specific laser en- ergy of about 5J = lat the efficiency of > 5:5% with respect to the electrical energy stored in the driving capacitors has been reached. A standard deviation< 0: 2% was obtained for 3J output ...

Figures 3 and 4 show the discharge voltage and laser pulse waveforms at a mixed gas pressure of 3.0 kPa for the direct-drive circuit and the capacitor-transfer circuit, respectively. As shown in Fig. 3, with the direct-drive circuit, the breakdown voltage was -55.2 kV.The fall time of the main discharge, corresponding to the discharge formation time, was ...

It should be mentioned that this excitation technique allows one to change the total laser pulse duration in the range of 4 to 14 s due to the variation of N content in the gas mixture. Fig. 6 depicts the CO laser energy and efficiency as a function of charging voltage on capacitor . The laser energy increases linearly with and reaches 3.2 J at kV.