

RISING stopped beam trigger

Take Saito and Nik Kurz

Two types of trigger

● Prompt trigger

- Request to the DAQ system for the data taking
- By sending NIM/ECL logic signals to the trigger module
- Data conversion is started by the prompt trigger
- Trigger timing well defined

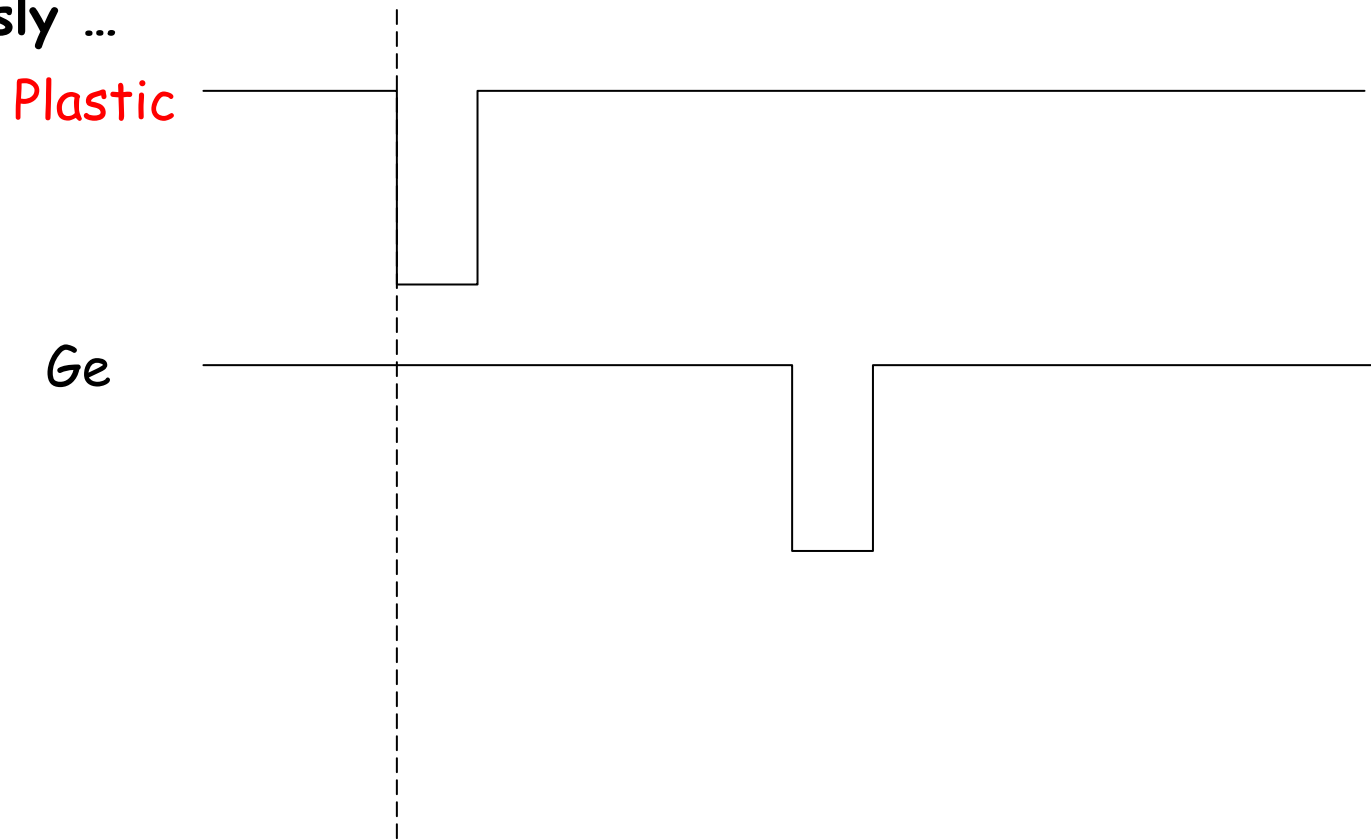
● Delayed trigger (a few hundreds nanoseconds to a few tens of micro seconds)

- Cancellation of the data into the stream
- Frequently used example : Fast clear
- Trigger timing has not to be defined

Clever experiments combine these two types in multiple levels

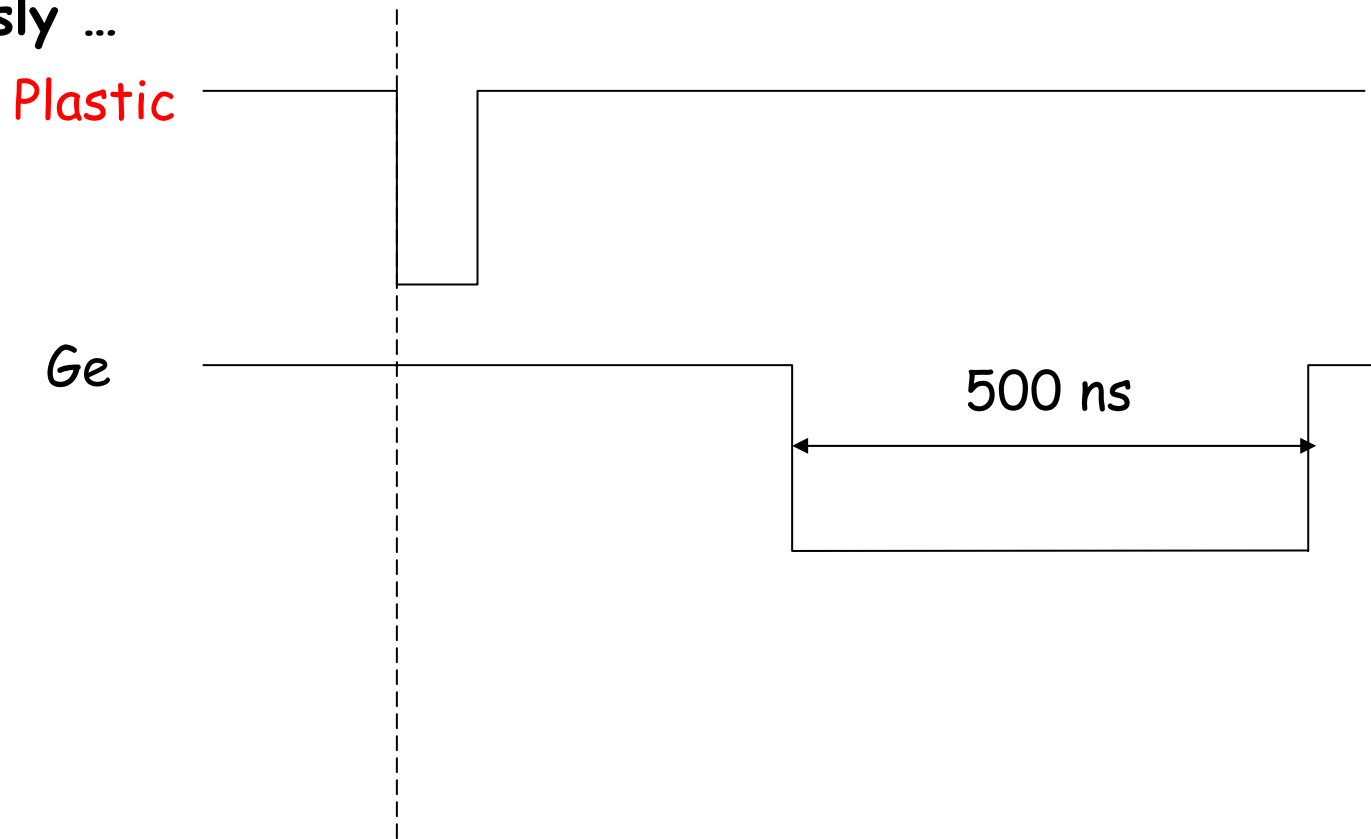
Very easy case : RISING fast beam trigger

- Ge + plastic coincidence trigger
- Timing defined by the fastest detector : Plastic
- Obviously ...



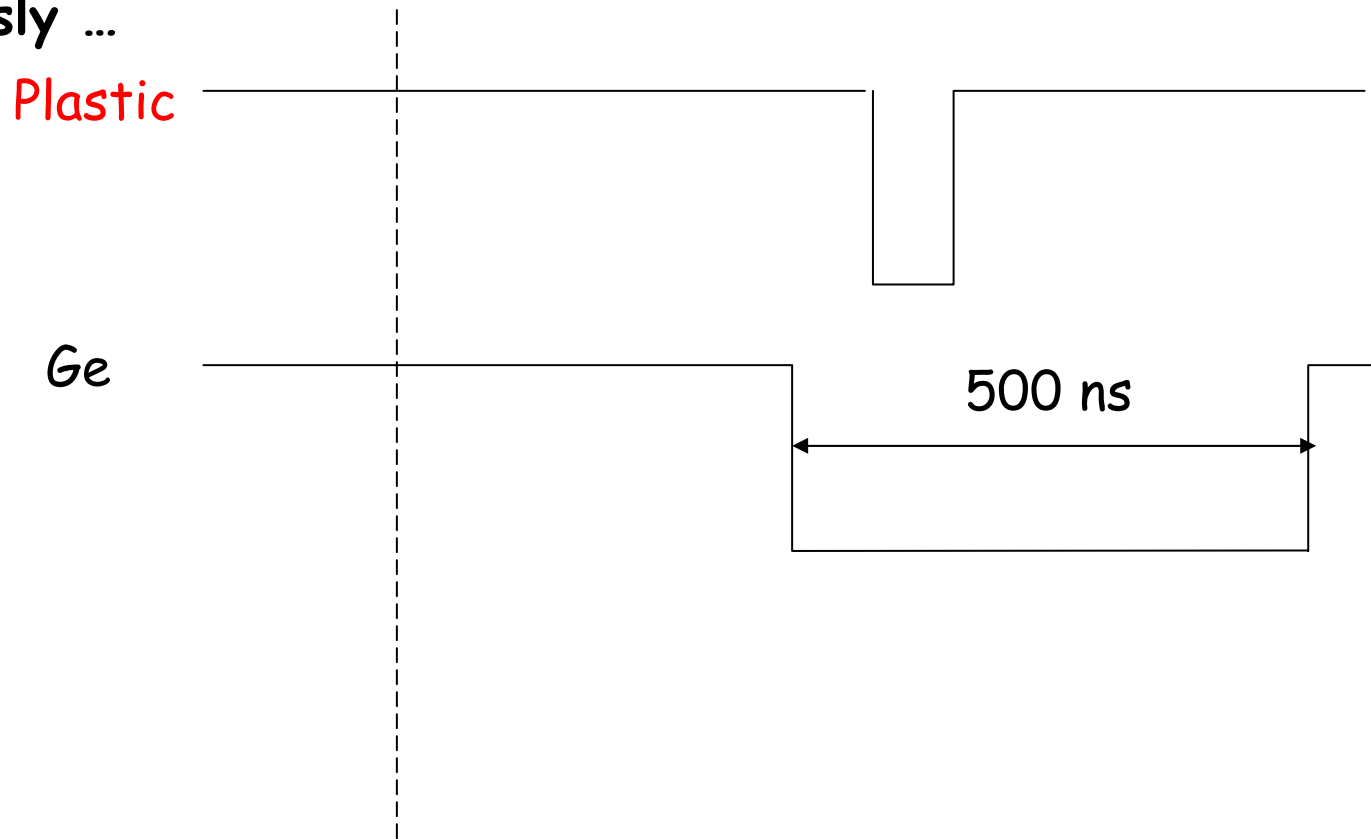
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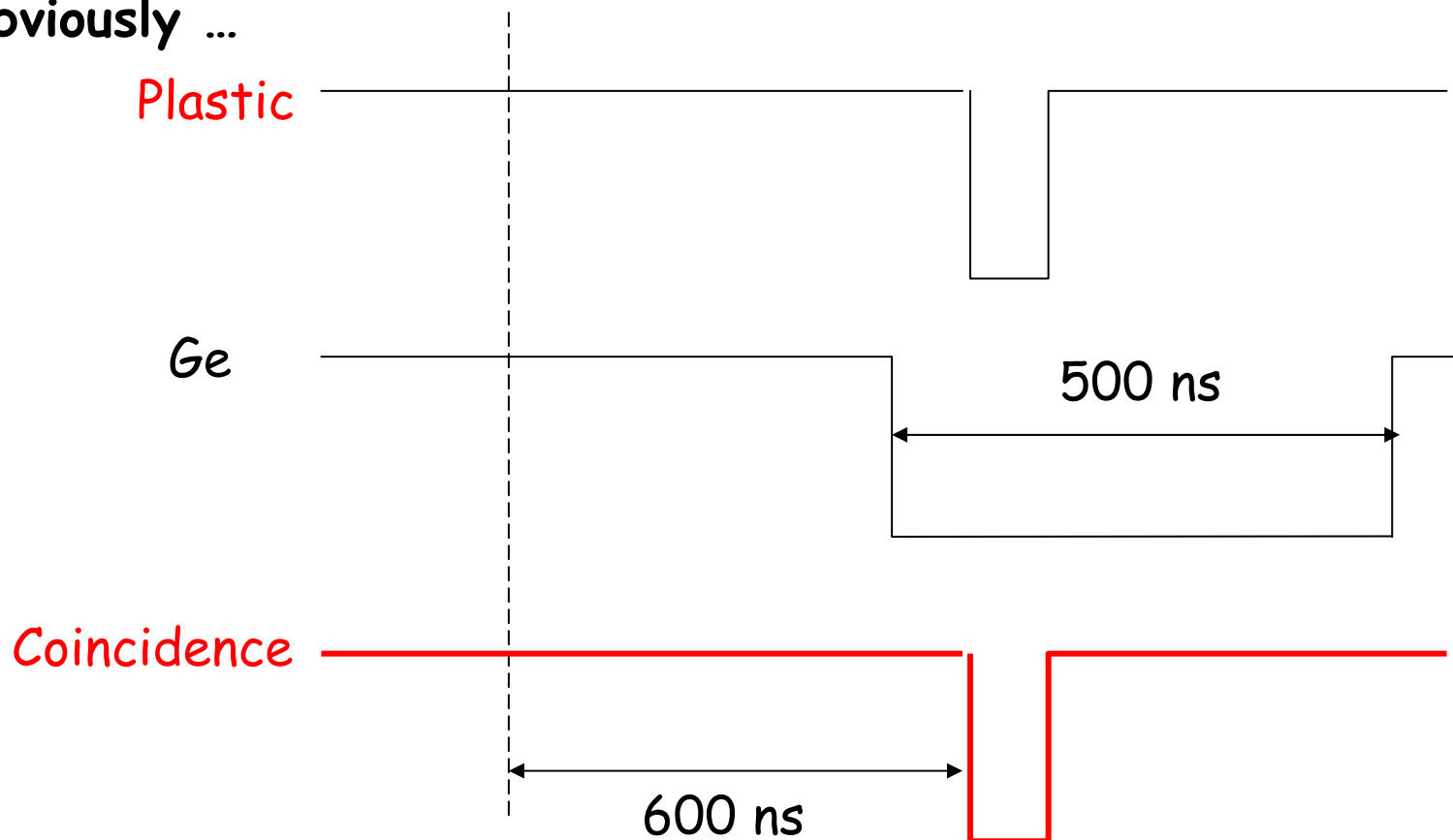
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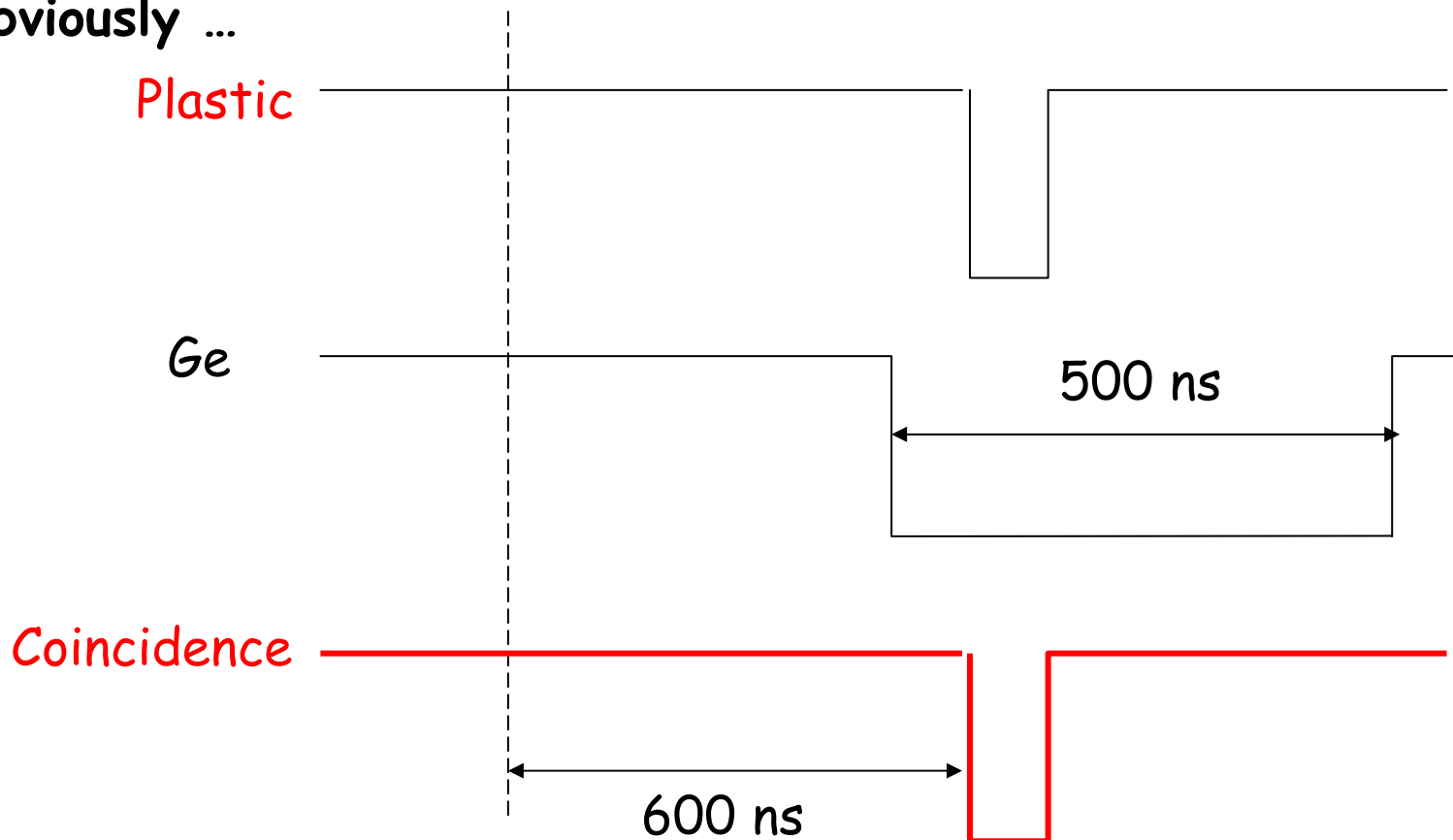
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Signals to ADC/QDC/TDC must be delayed by 600 ns

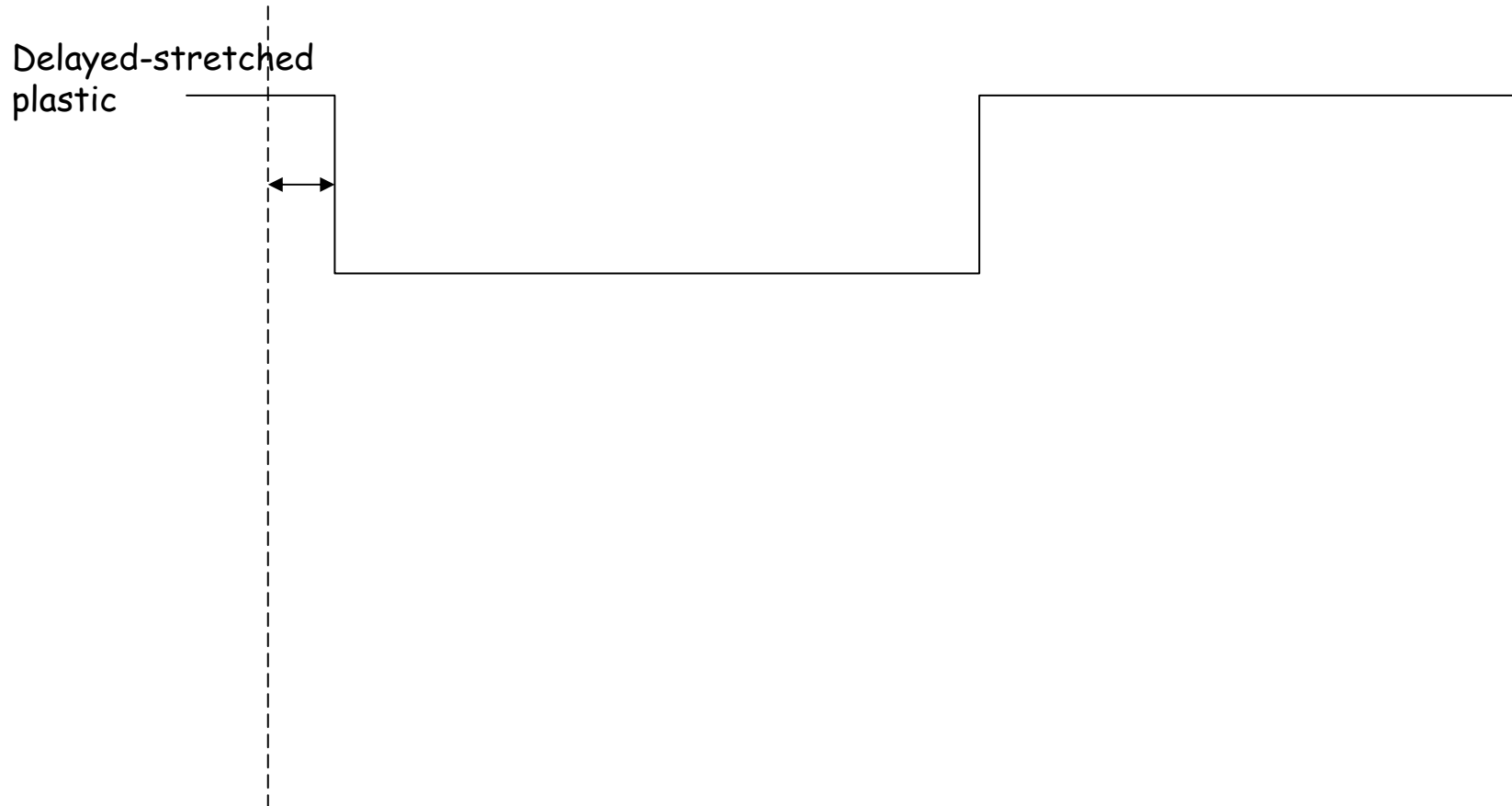
Another very easy case : Stopped beam trigger with a traditional way

- Time gate opened by plastic signals
- Trigger timing must be defined by plastic signals



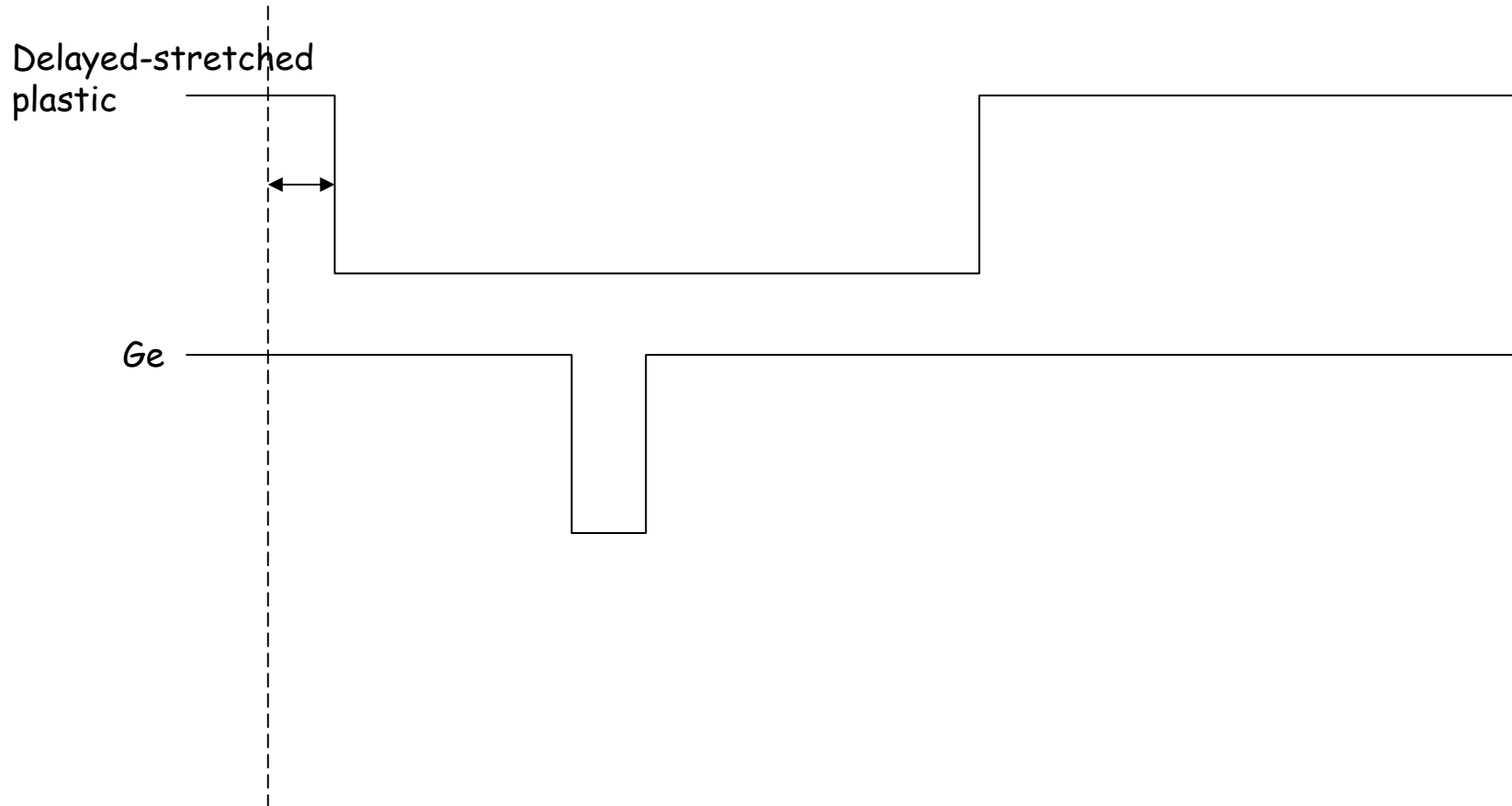
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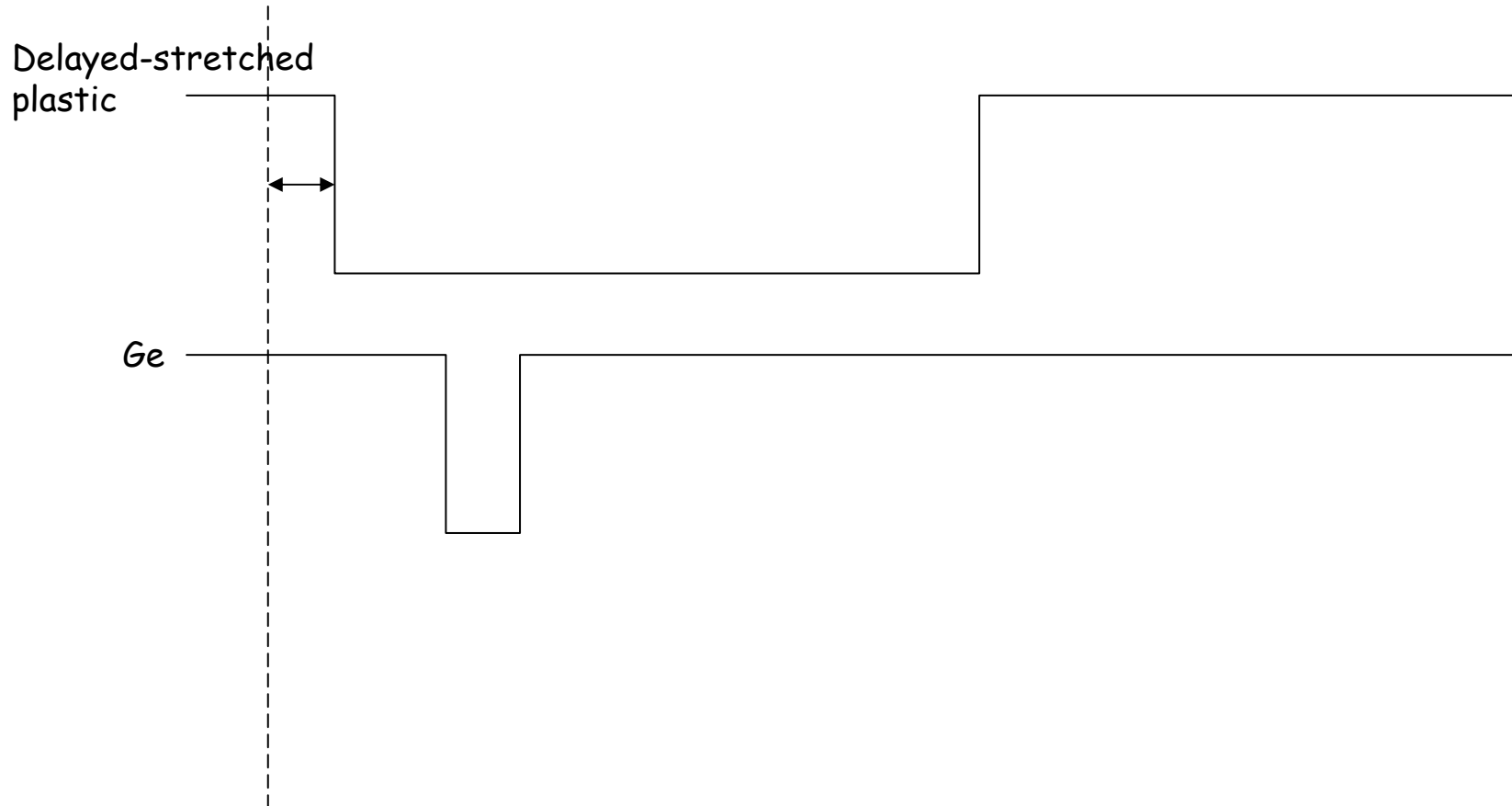
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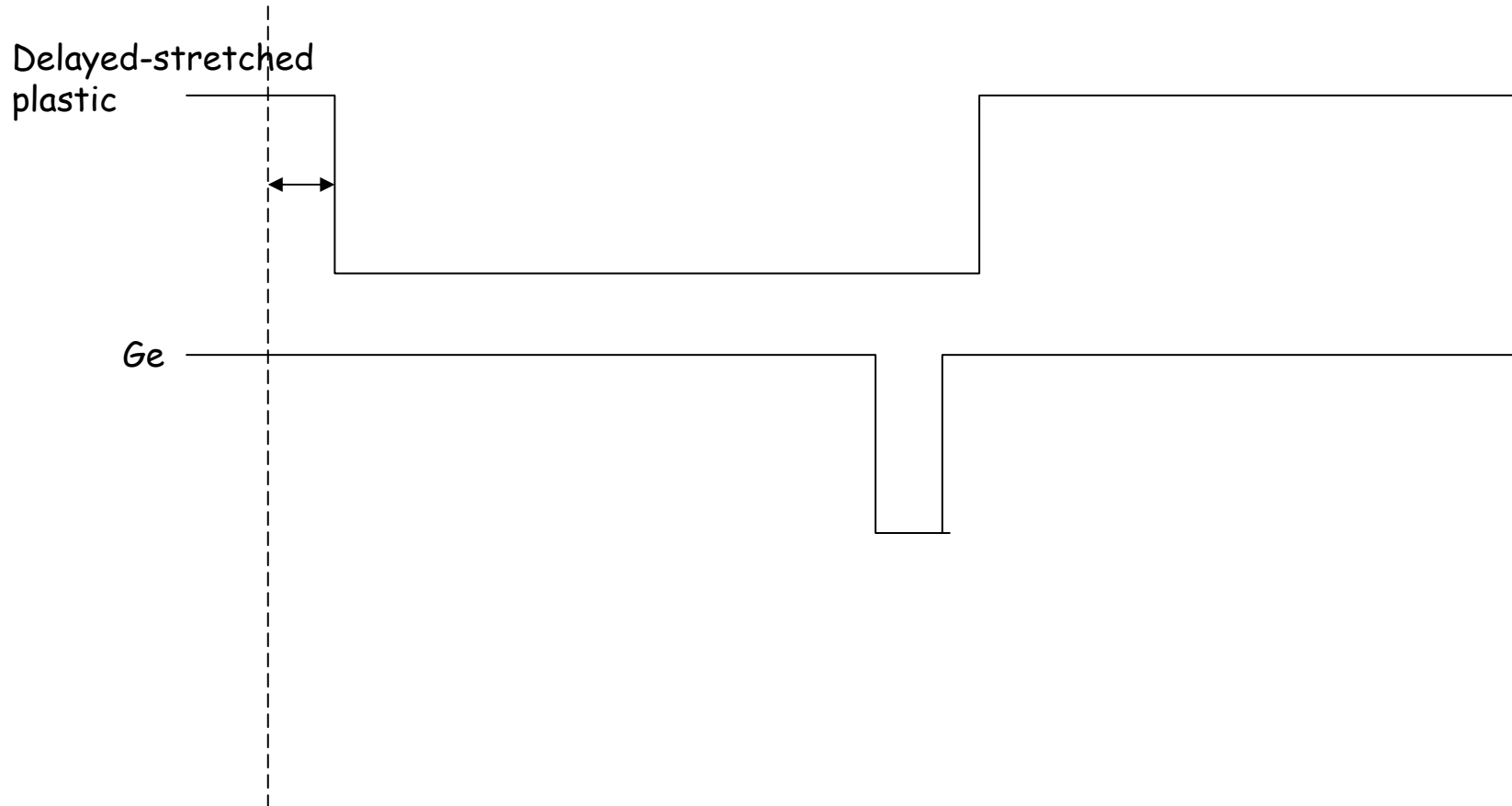
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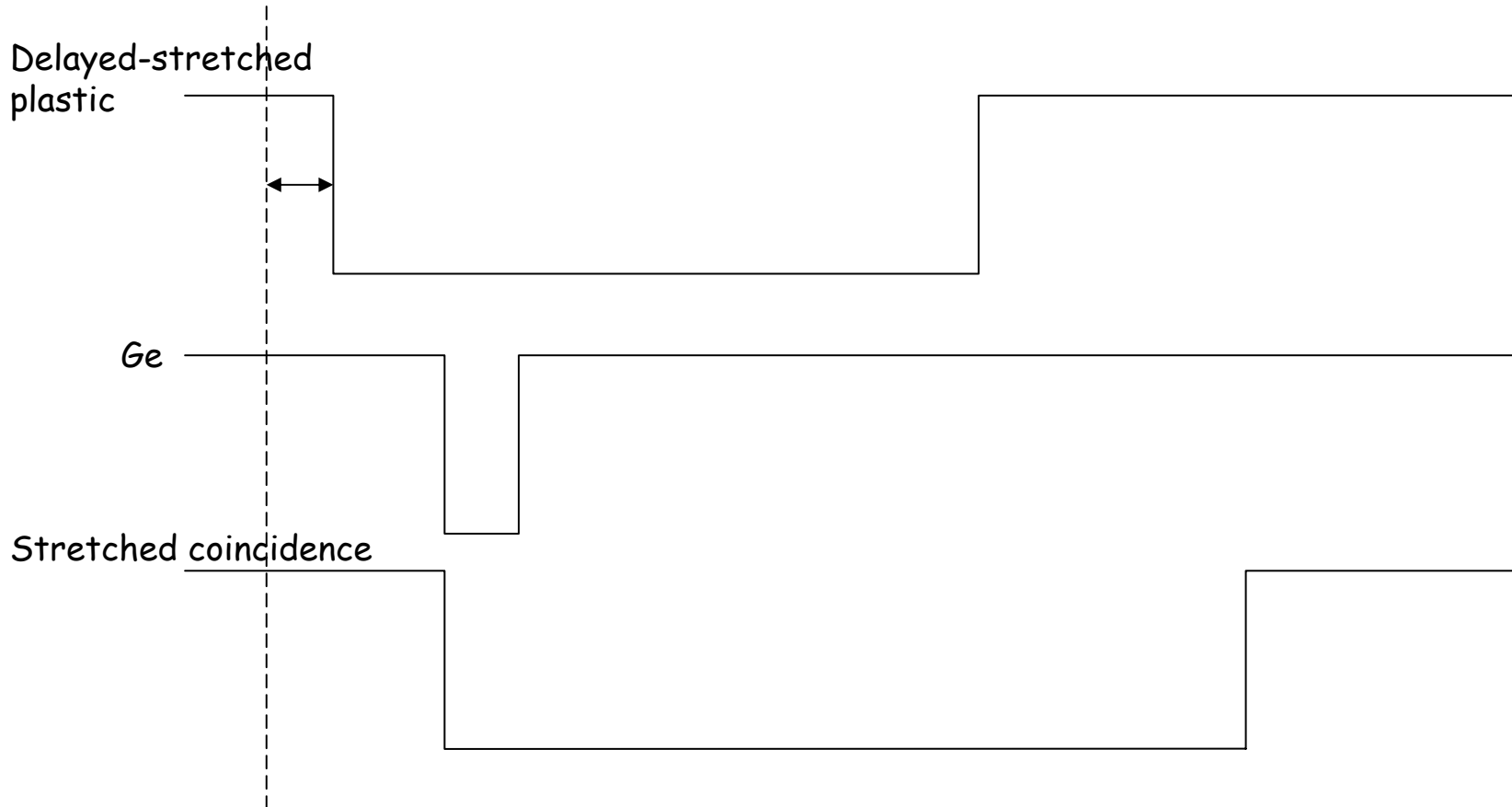
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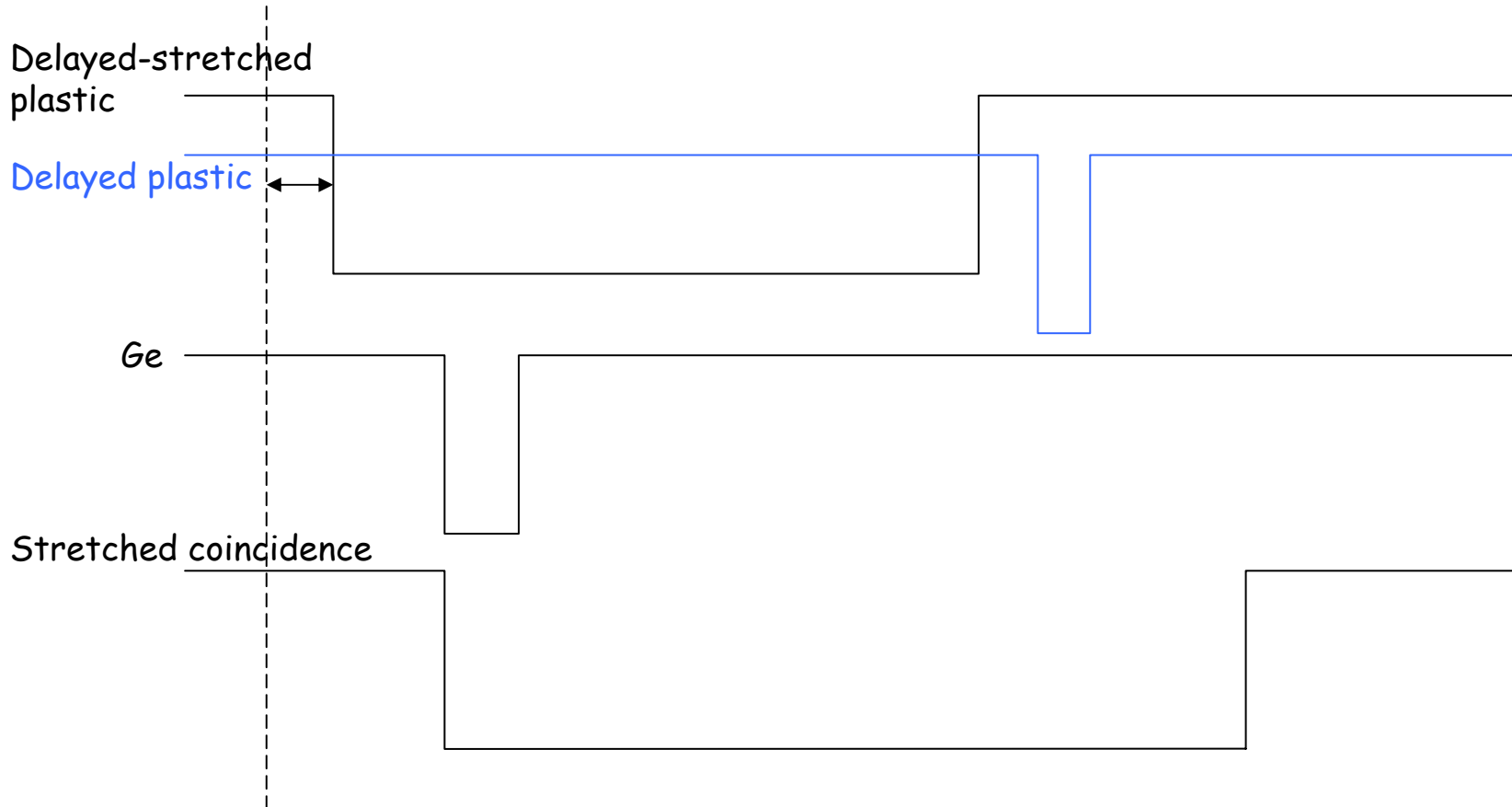
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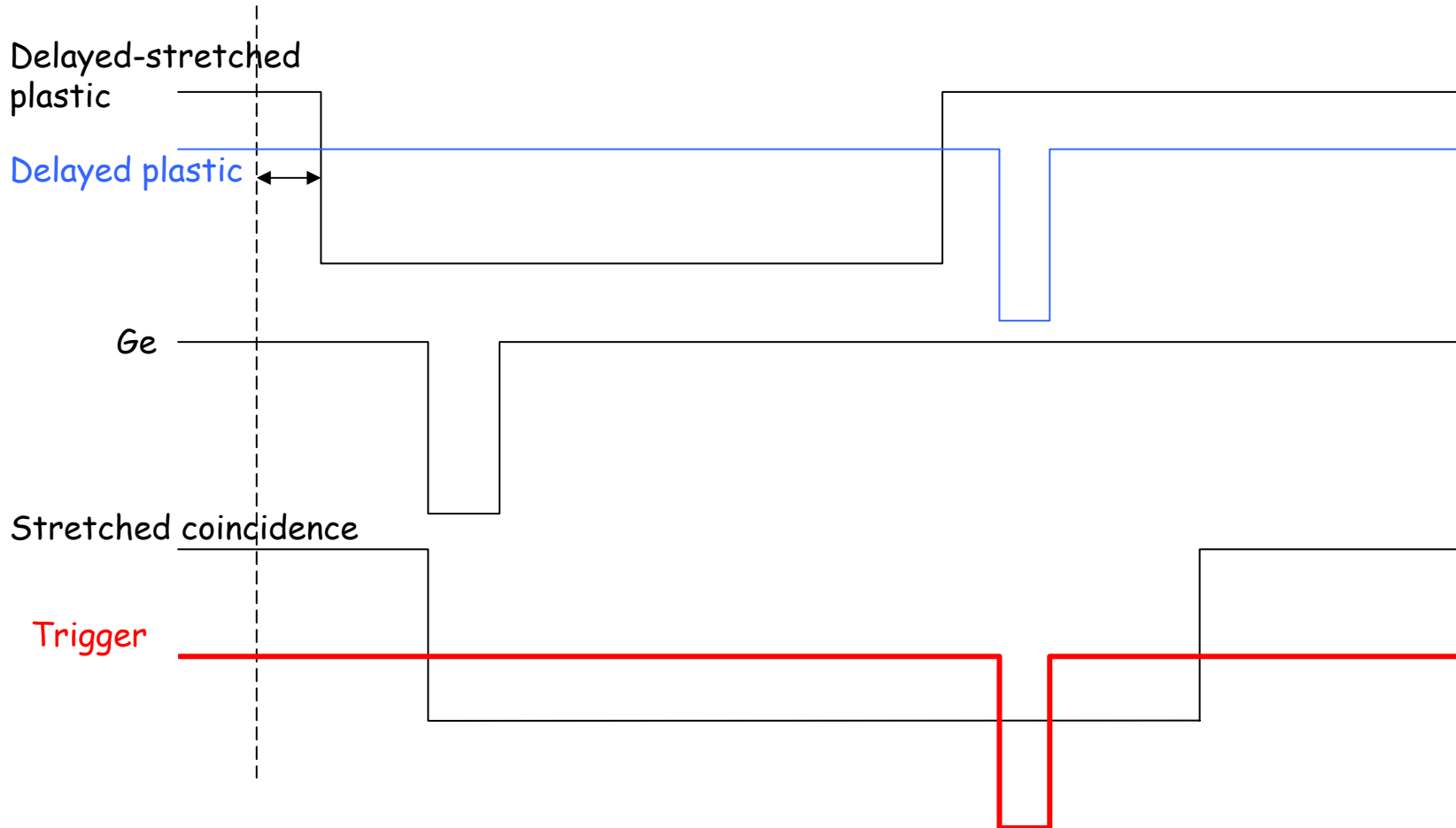
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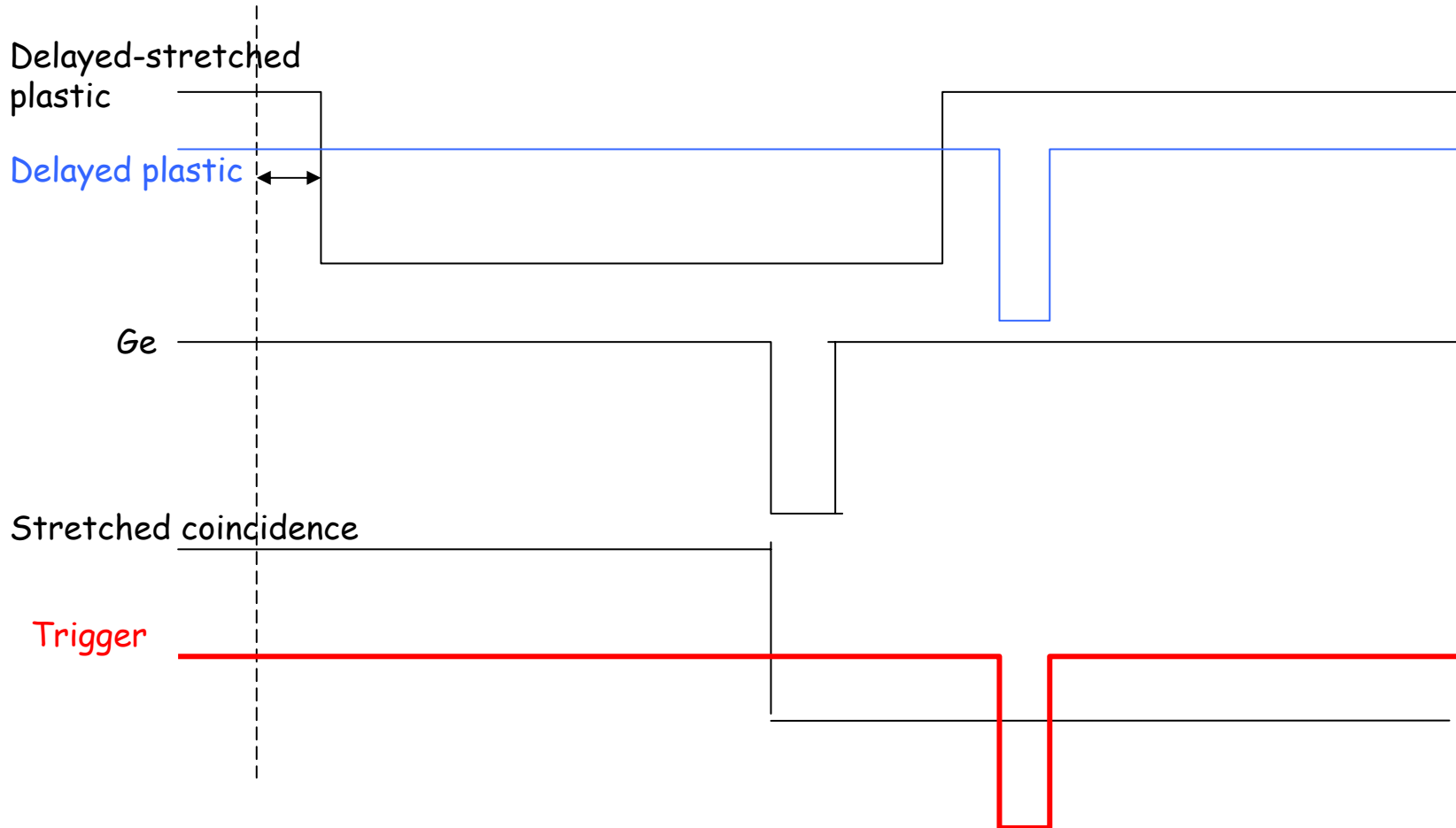
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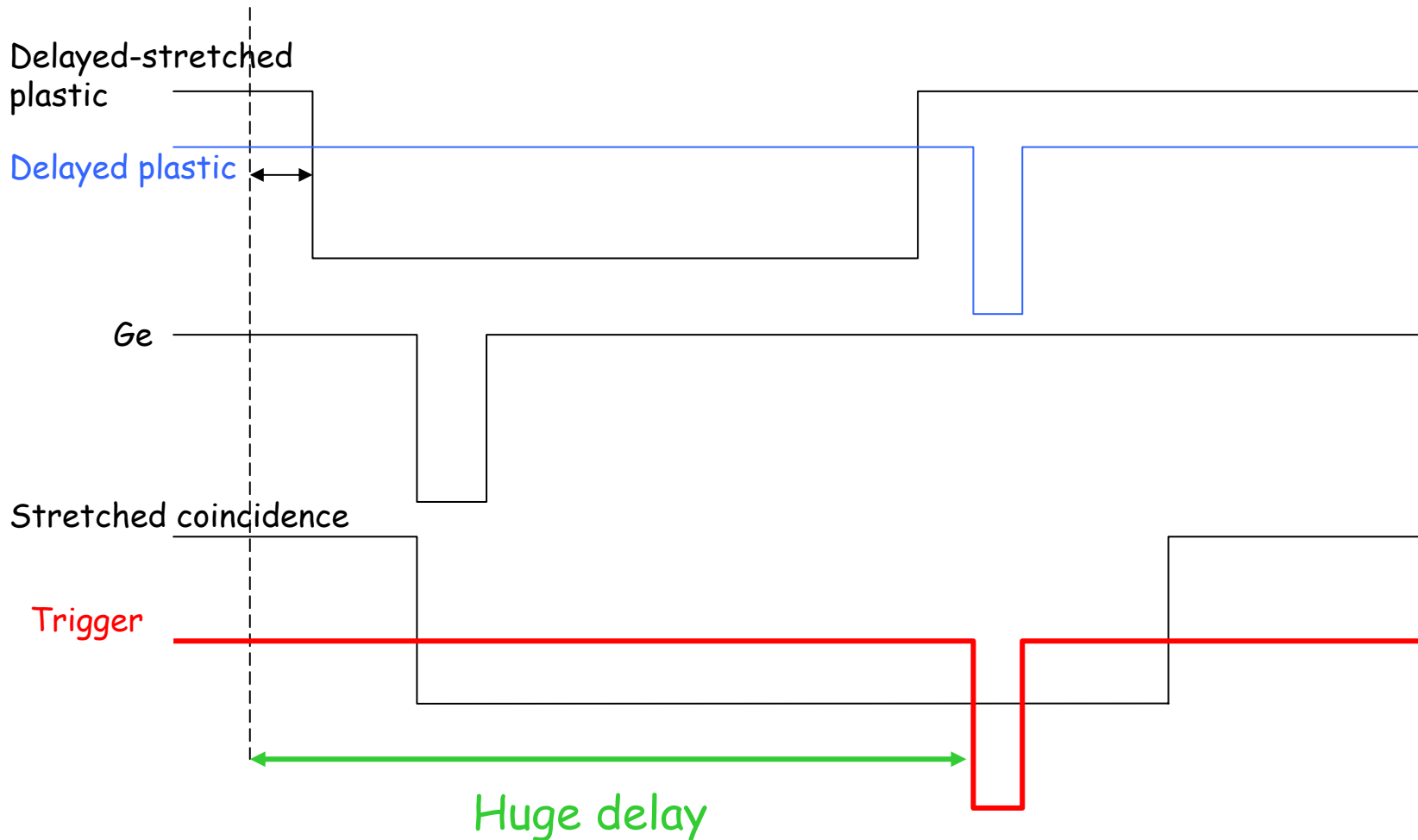
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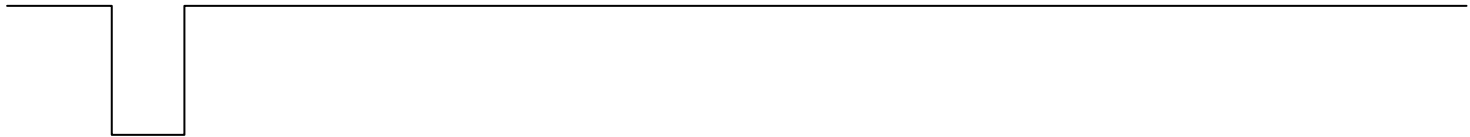
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Stopped beam trigger with multiple levels

- Trigger by fast plastic signals (up to a few k Hz)
- Fast clear when Ge is not fired within the time gate

Fast plastic



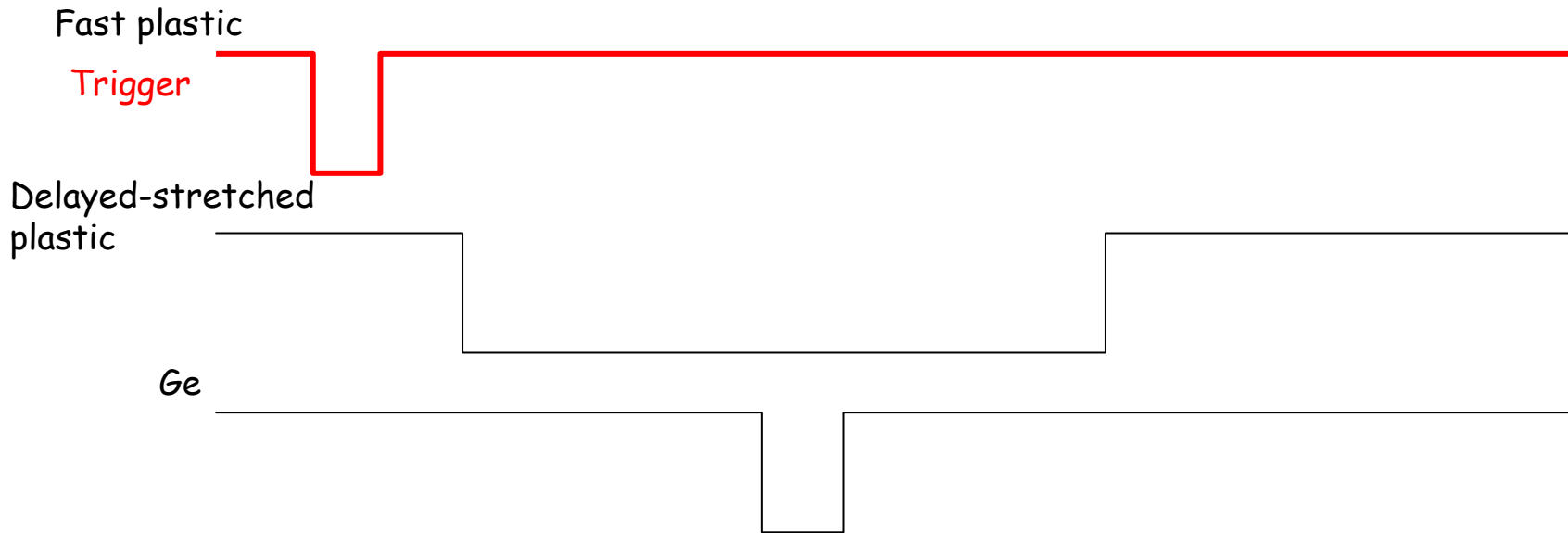
Stopped beam trigger with multiple levels

- Trigger by fast plastic signals (up to 10 k Hz)
- Fast clear when Ge is not fired within the time gate



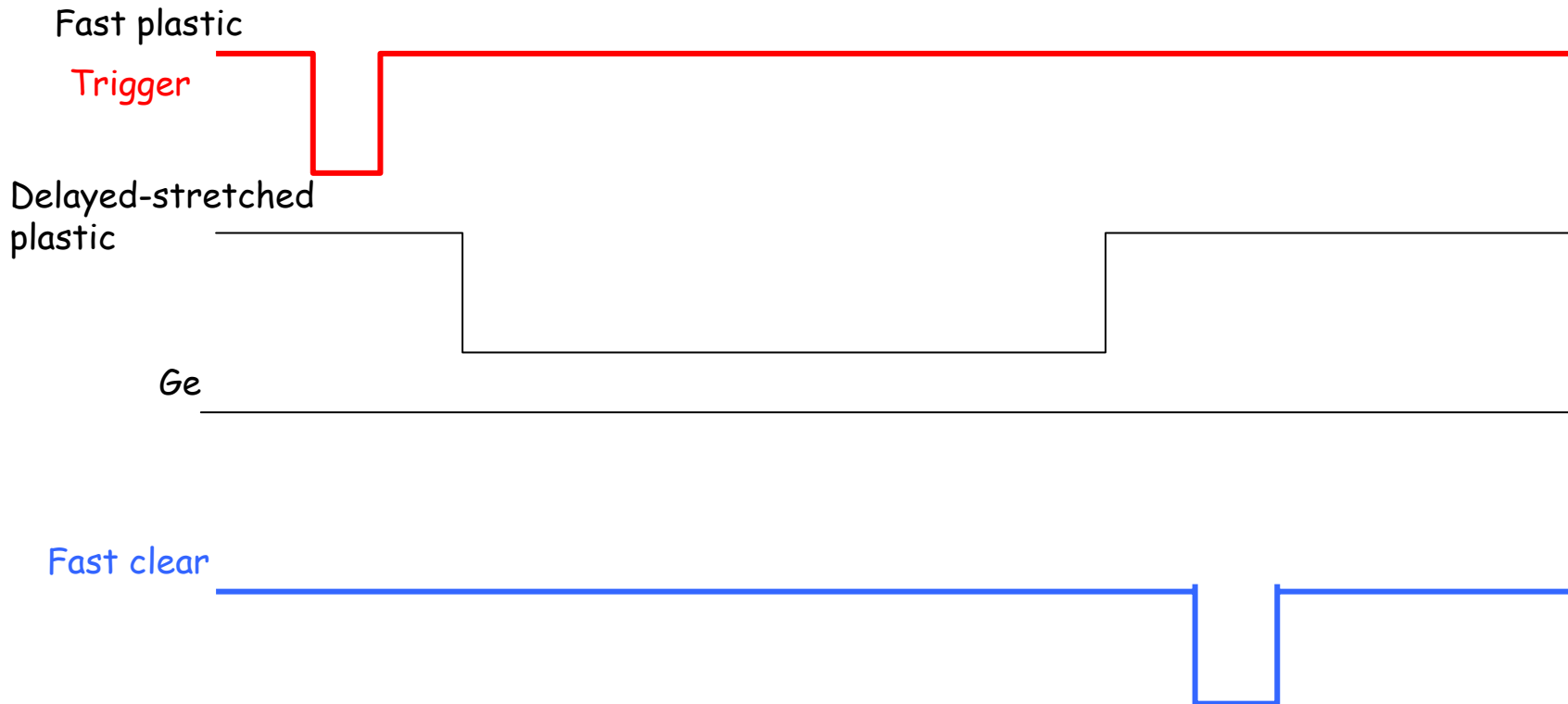
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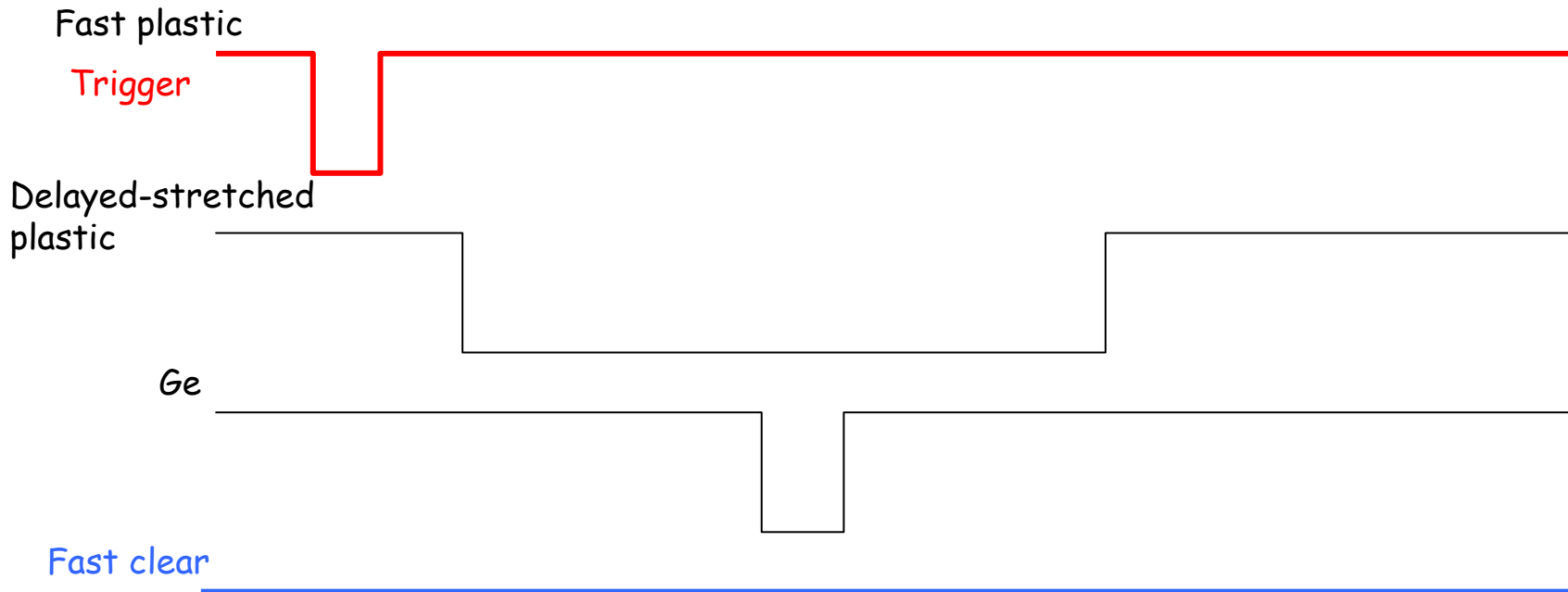
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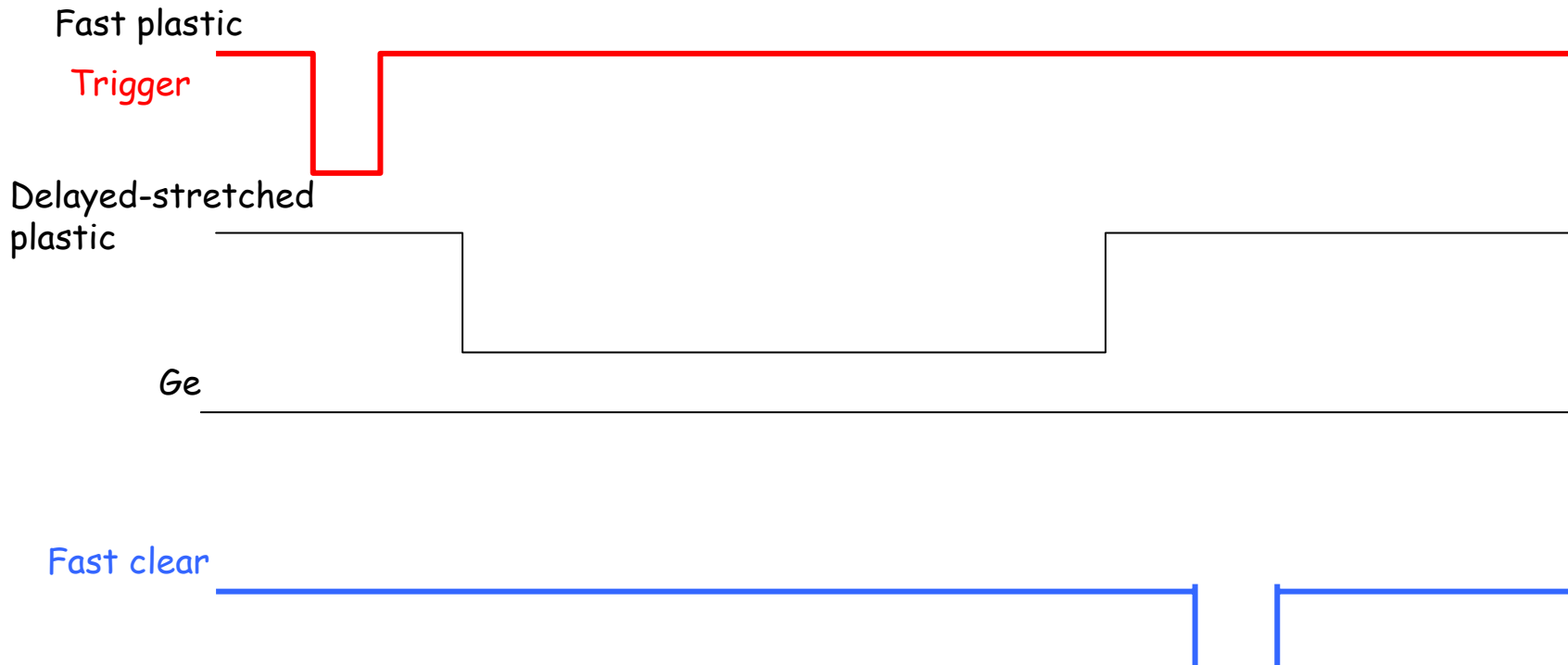
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- No delay needed for raw signals
- Very flexible for isomer measurements (can be used as fast beam trigger)

Some important issues

- If you would implement different types of triggers (for example, singles, delayed singles, delayed coincidence ...)
 - Trigger must be tagged by
 - Some bit information in any of ADC/QDC/TDC
 - Trigger ID given by the VME trigger module
- VXI Time information is only for “self-start self-stop”
 - Lifetime measurements must be done by other modules
 - TAC/TDC ...
 - Do you need lifetime information with individual detectors?

Who has to make triggers (not me)

- **My strong personal opinion (true in the most of good experiments)**
 - There must be no universal trigger aiming different physics
 - Each experiment must have its own unique trigger
 - Large efficiency
 - Large signal/background ratio at the trigger level
 - High rate capability
 - Multi-levels : Easy to handle
 - **Trigger has to be controlled by the spokesperson of the experiment**
 - **Good trigger already guarantees at least 50% of the success of the experiment**
 - Trigger must be understood quantitatively
 - ▶ **No guess please**
 - How much background in the trigger level?
 - How much livetime?
 -

Another important things

- **Trigger is highly related to DAQ**
 - The person who will work on the trigger must know
 - How VME/VXI works
 - How the data stream looks like
 - How MBS works
 - Very strong cooperation with Nik Kurz
- **Independent diagnostic program to check triggers**
 - Completely independent from spy and so on.
 - Special fast compact program only for the trigger diagnostic
- **Skill on the both hardware and software needed**