

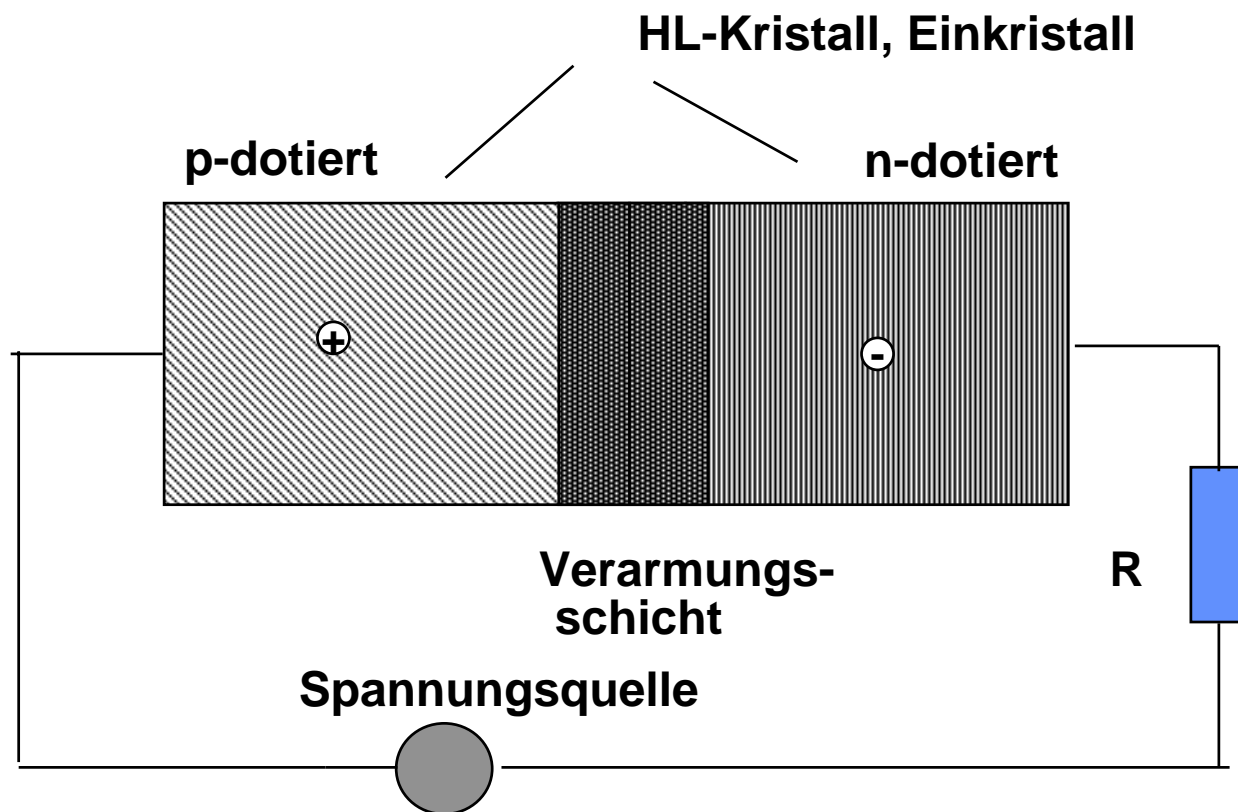
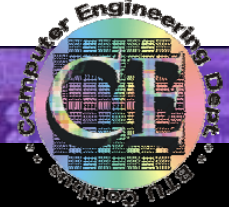
Elektronik-Grundlagen I Elektronische Bauelemente

- Einführung für Studierende der Universität Potsdam -

H. T. Vierhaus

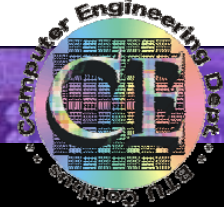
BTU Cottbus

Technische Informatik

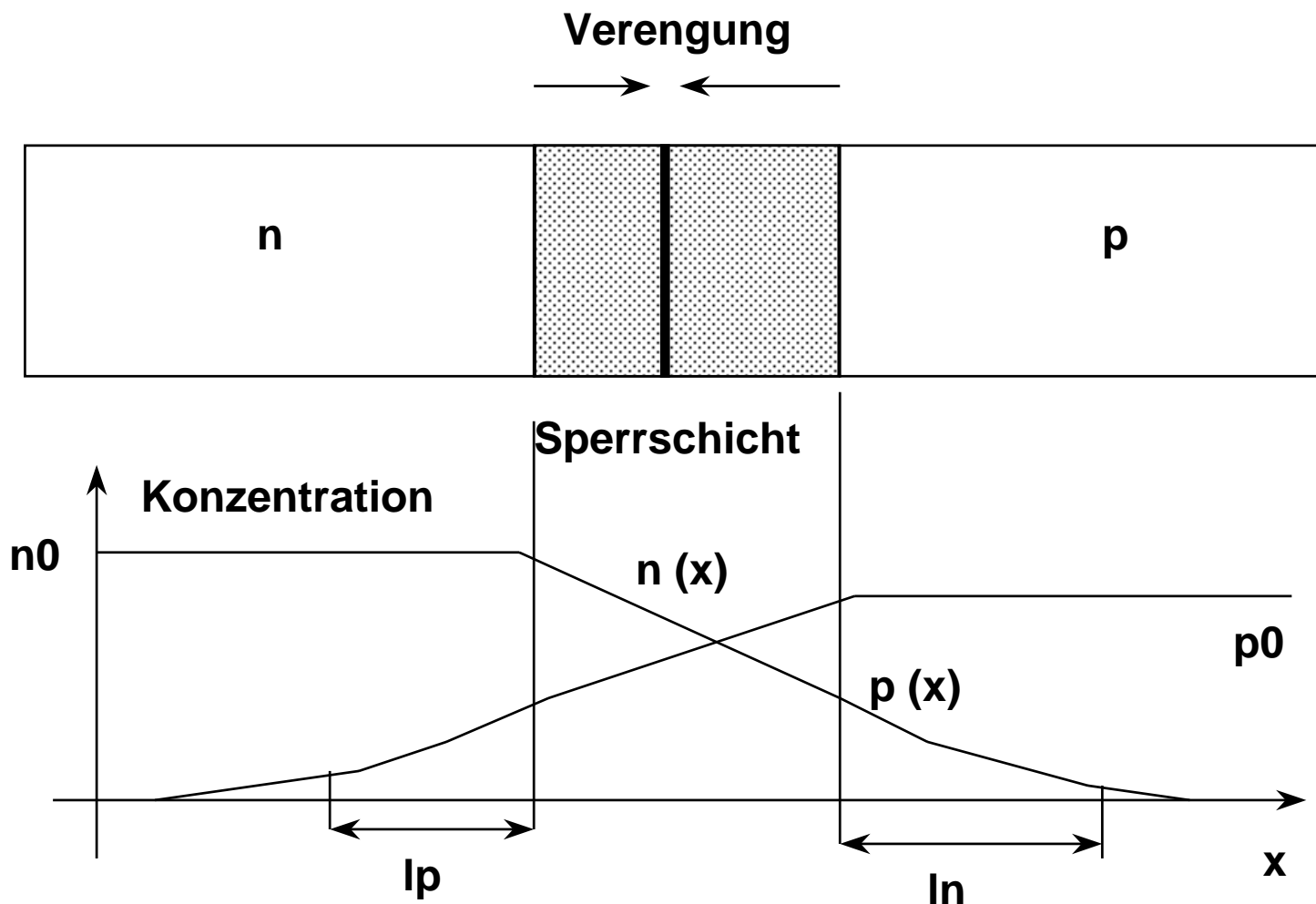


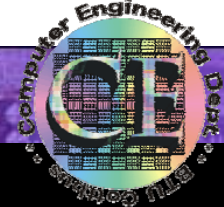
Durchlaßrichtung: + -

Sperrichtung: - +



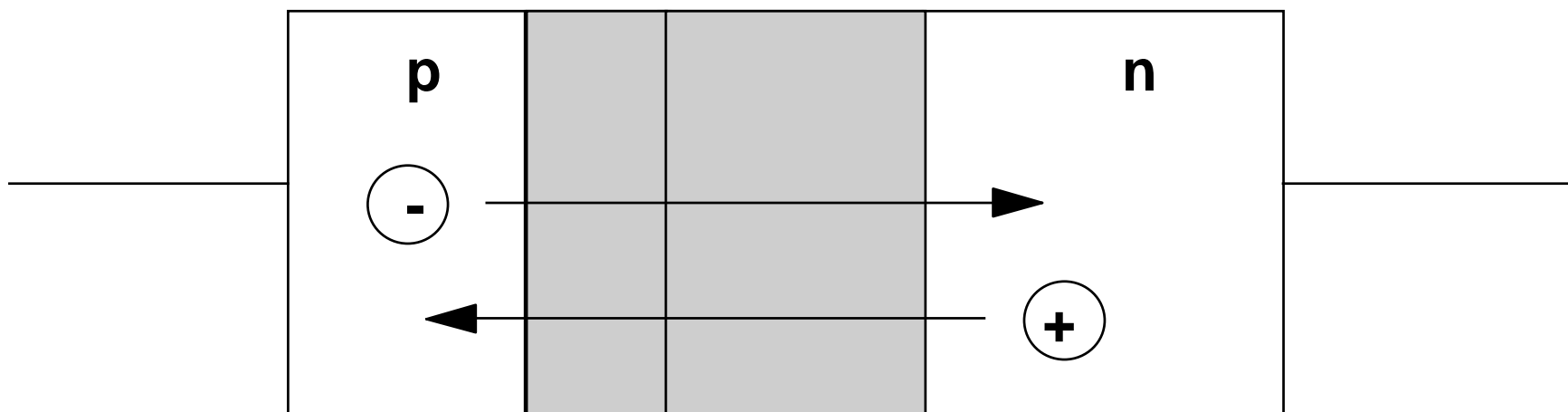
p-n-Diode in Flußrichtung



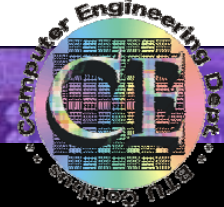


p-n-Übergang in Sperr-Richtung

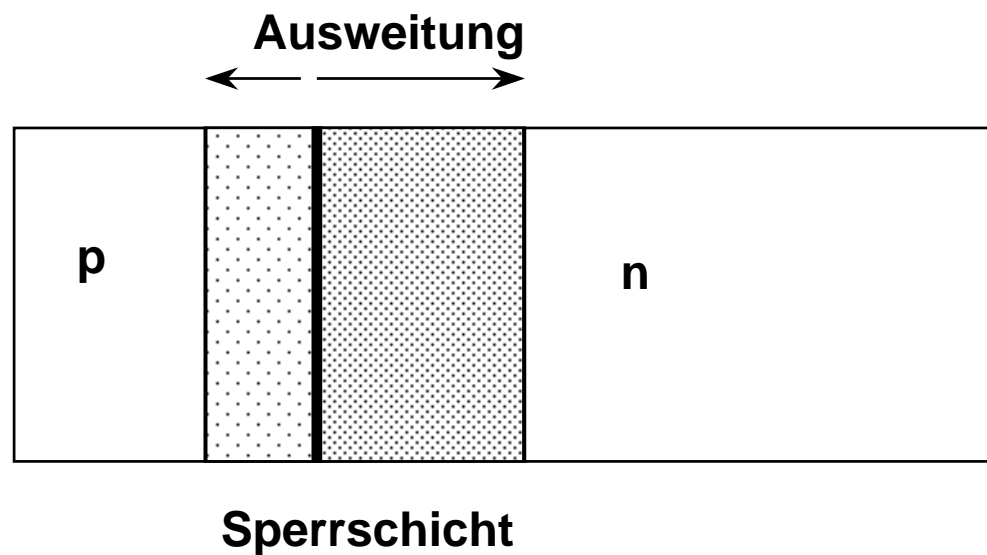
Sperrschicht

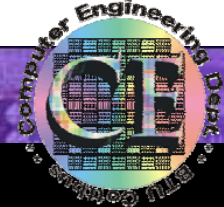


Minoritätsträger

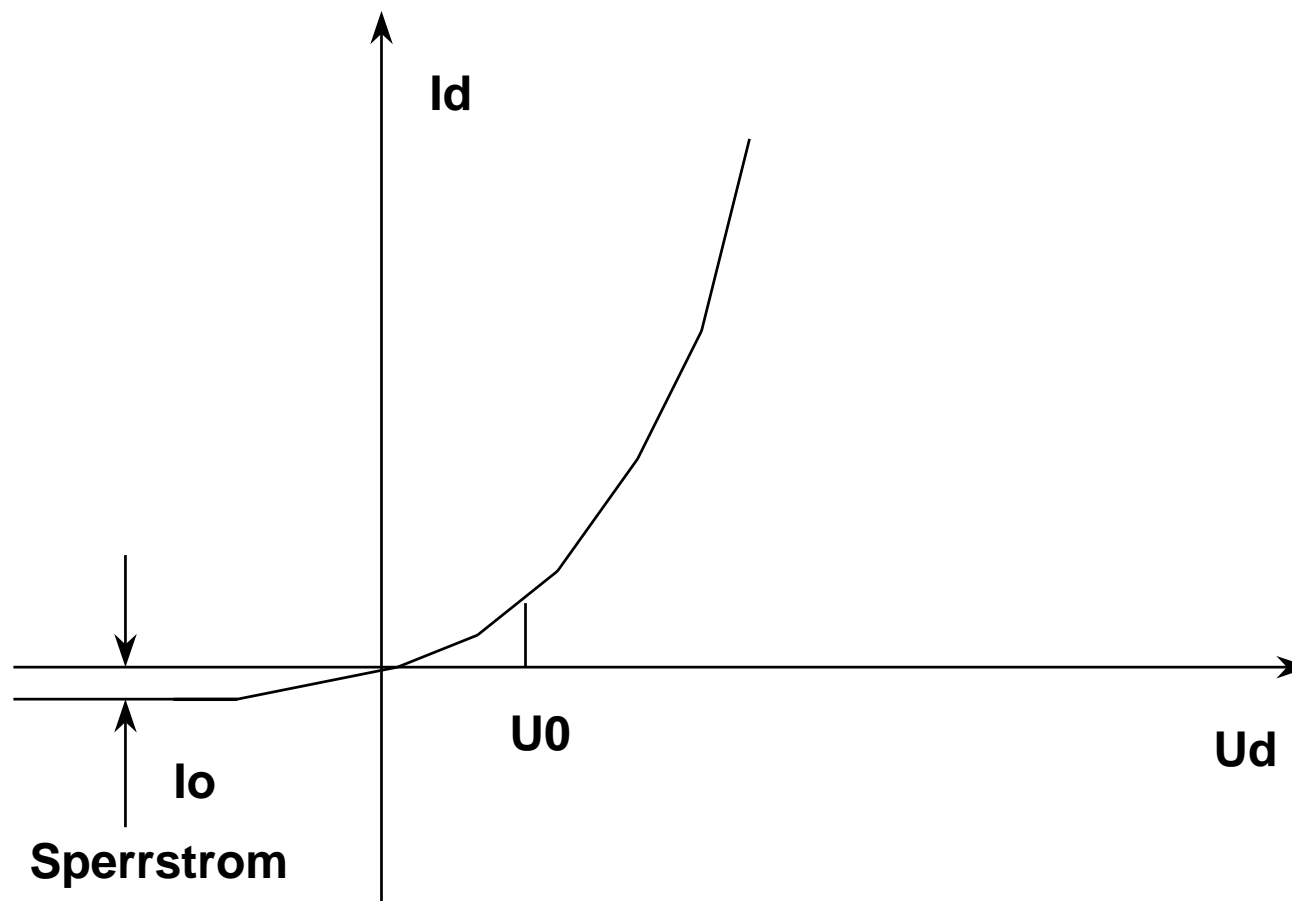


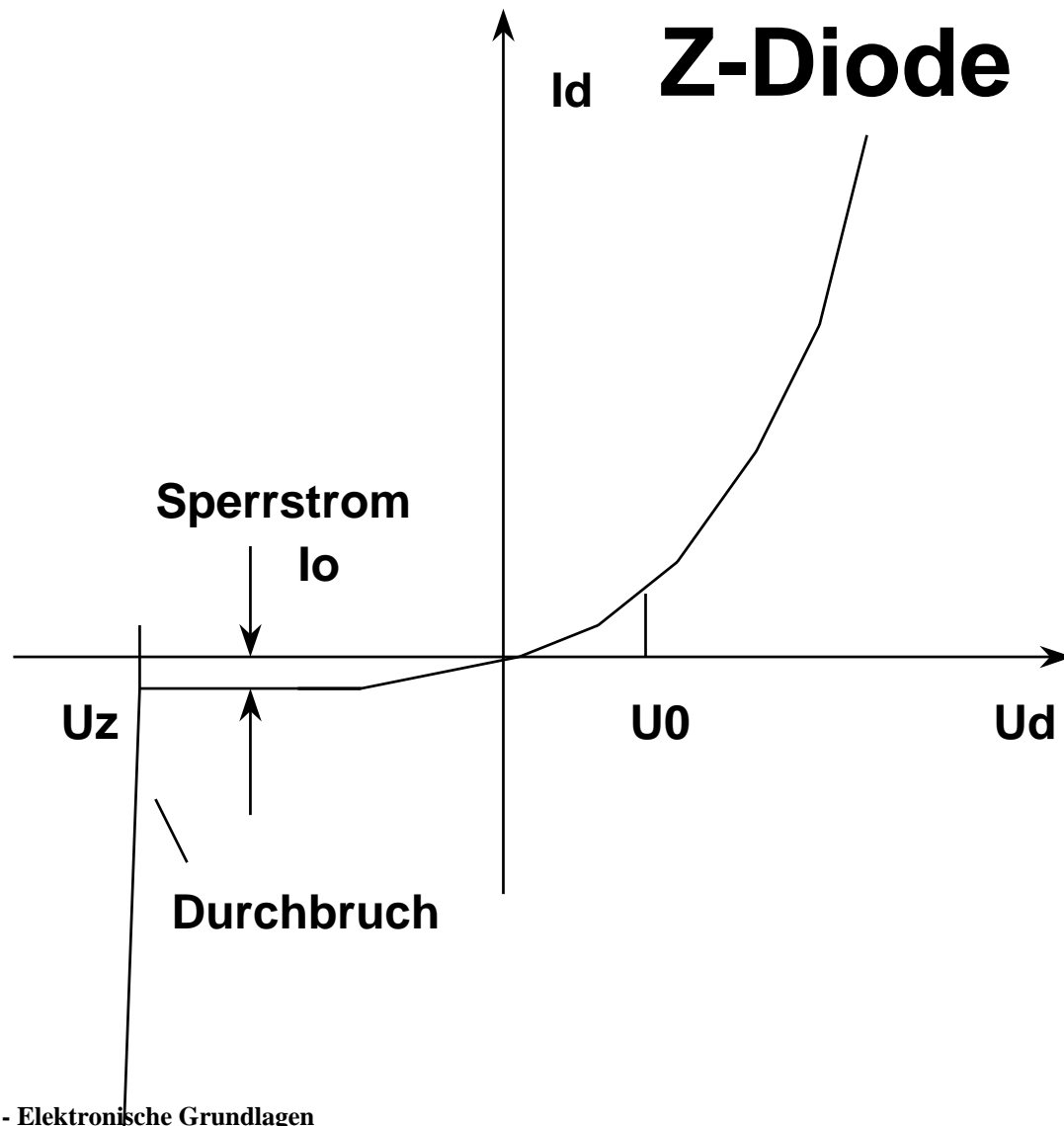
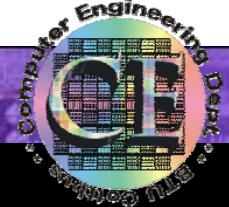
P-N-Diode in Sperrrichtung

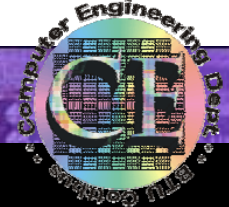




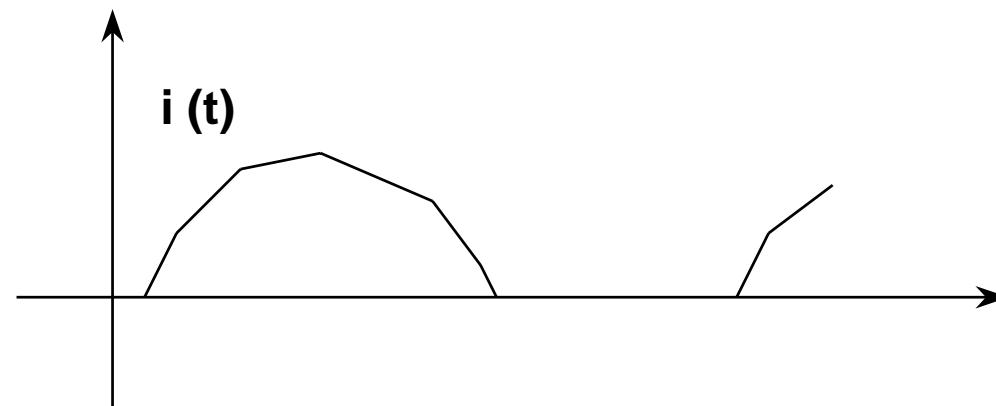
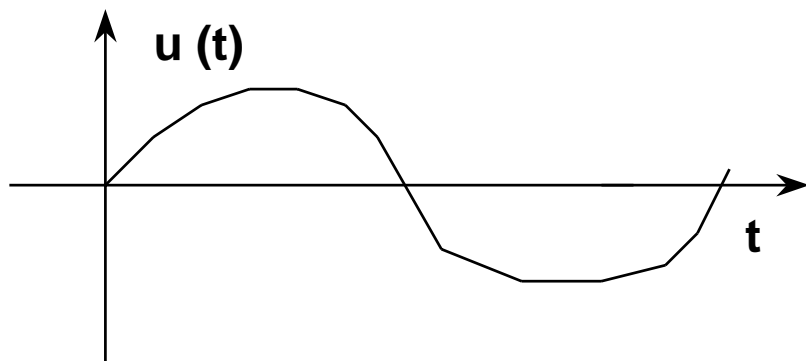
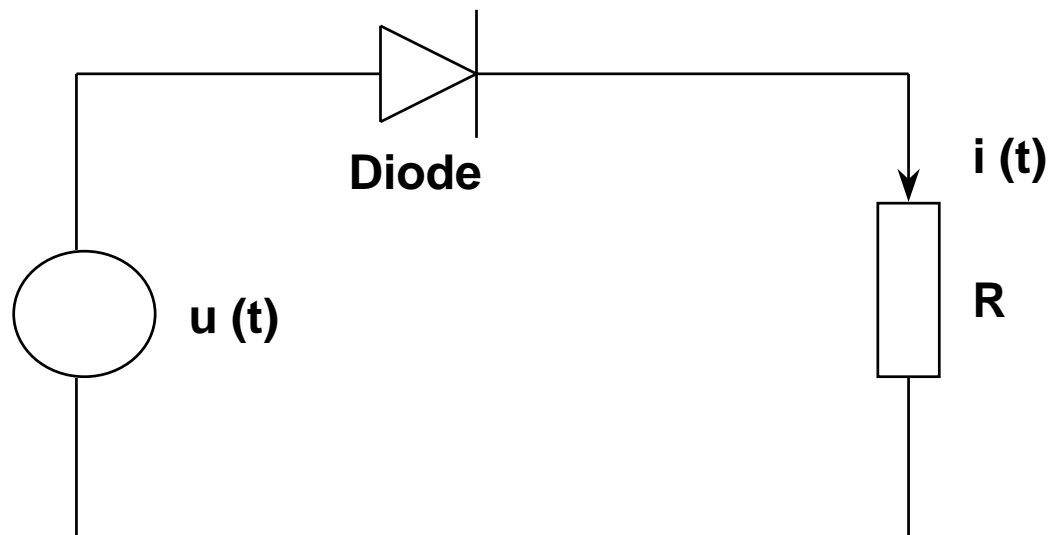
Strom-Spannungs-Kennlinie des p-n-Übergangs

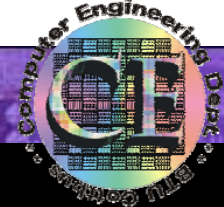




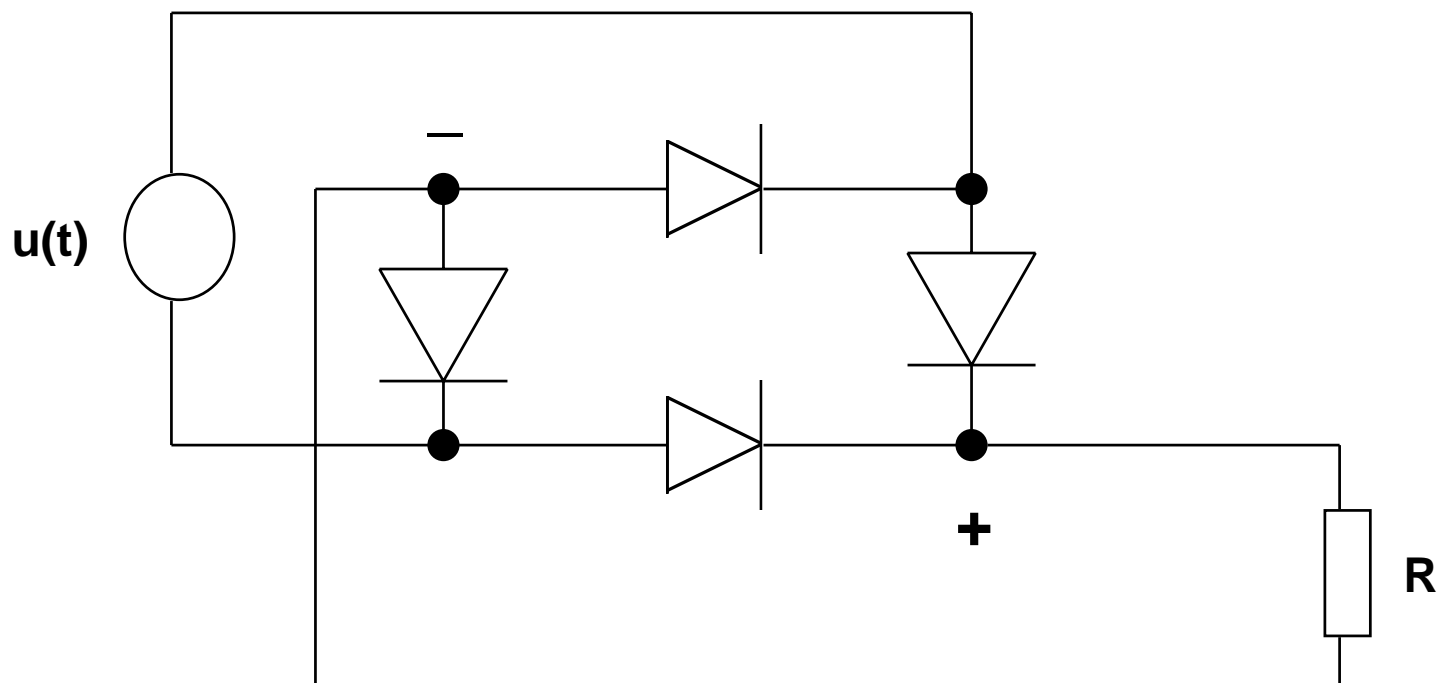


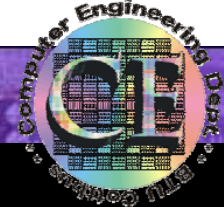
Einweg-Gleichrichter



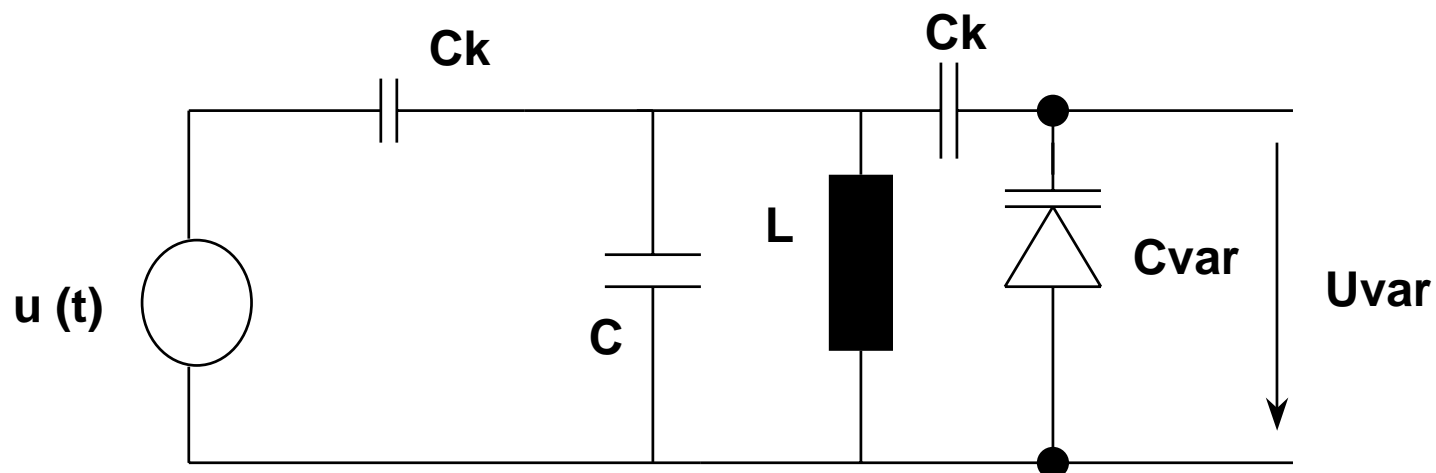


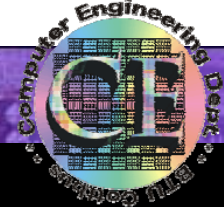
Brücken-Gleichrichter





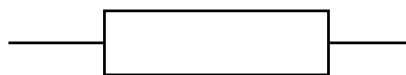
Kapazität-Variationsdiode



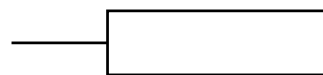


Erstschaltungen von realer passiver Bauelemente

Widerstand



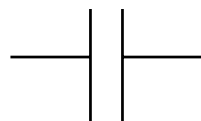
R



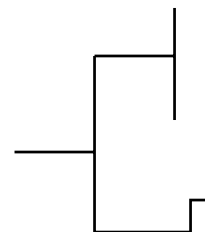
L



Kondensator



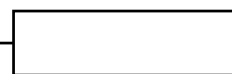
C



L



R



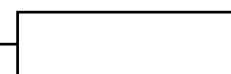
Spule



L

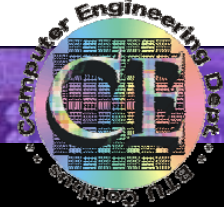


R

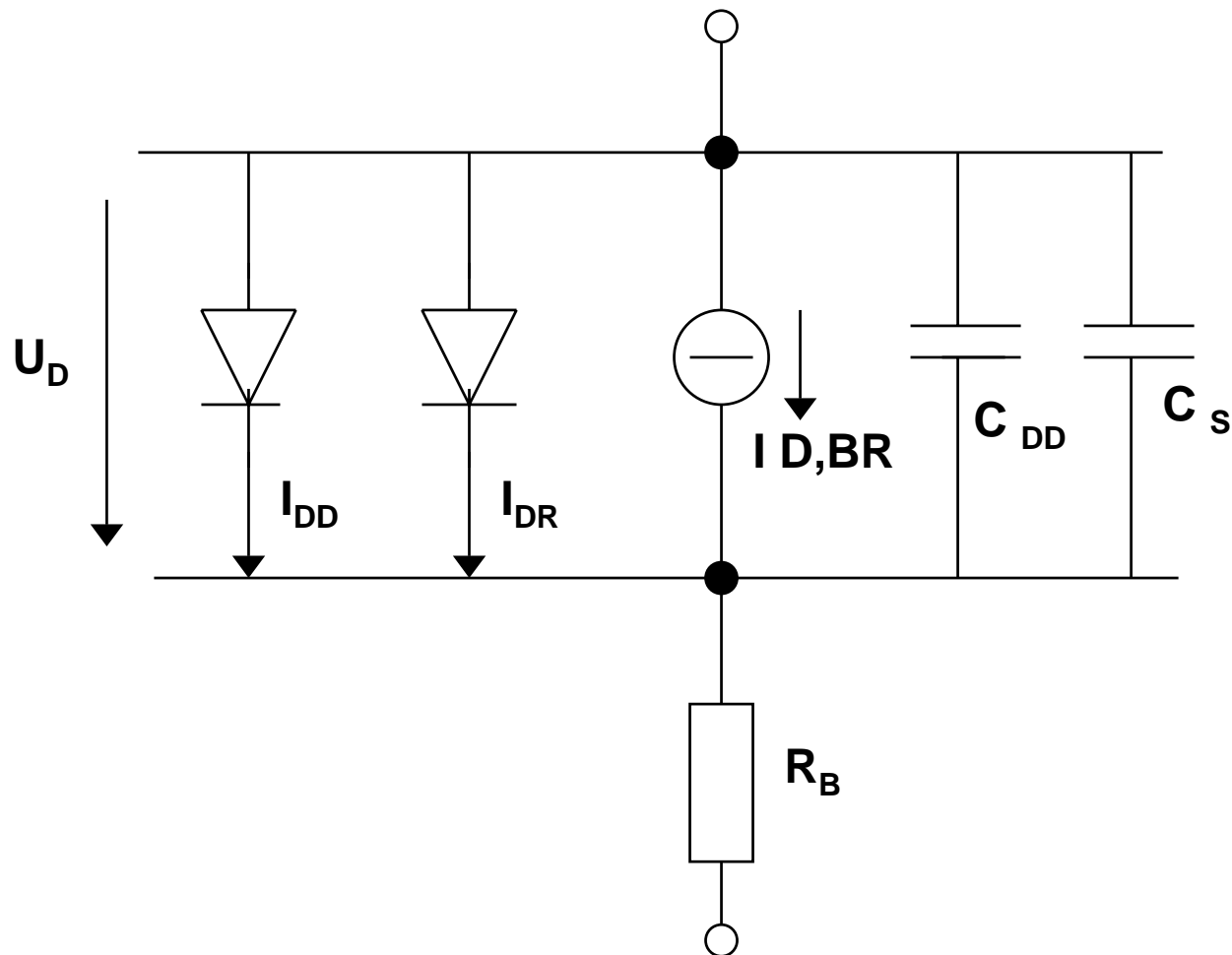


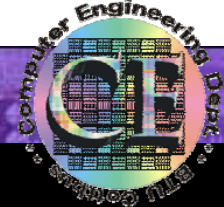
C





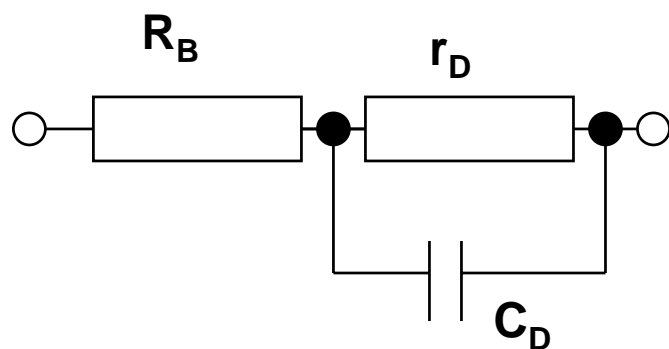
Ersatzschaltbild einer Diode



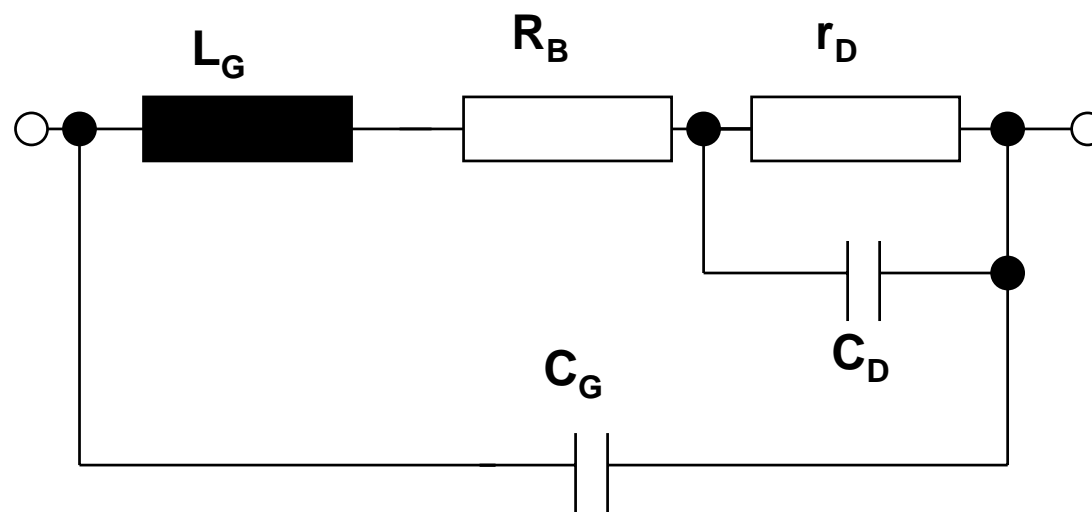


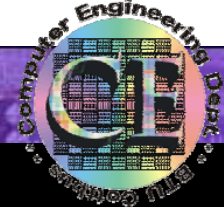
Lineare Kleinsignal-Ersatzschaltungen einer Diode

NF- Ersatzschaltbild

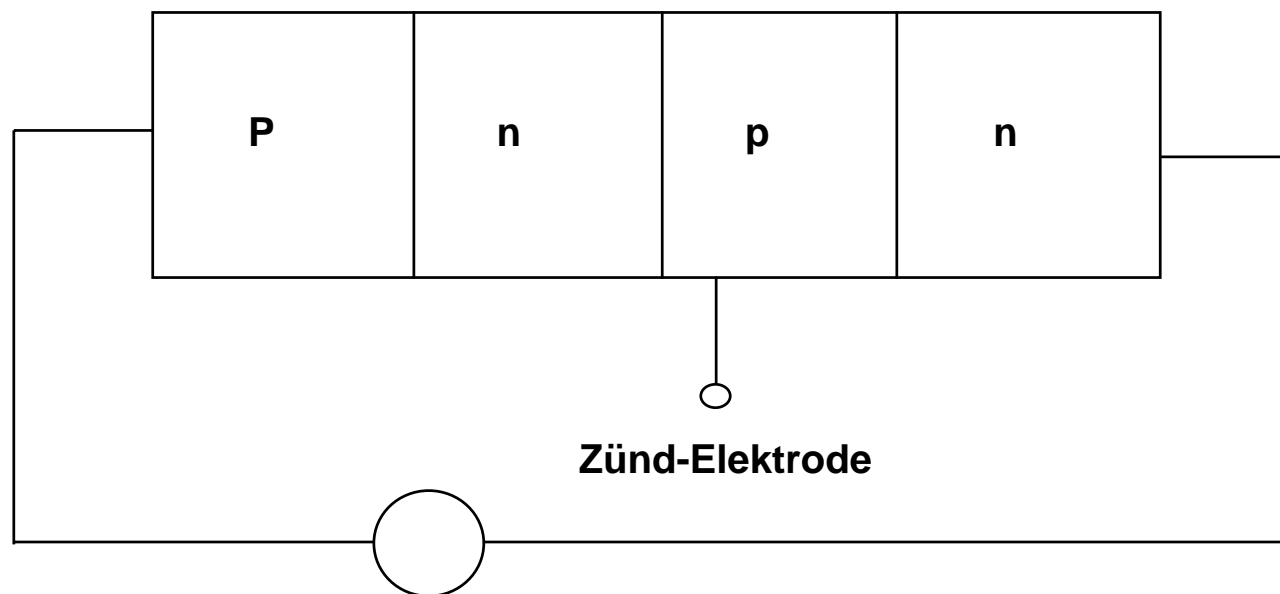


HF- Ersatzschaltbild

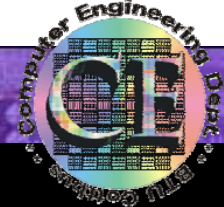




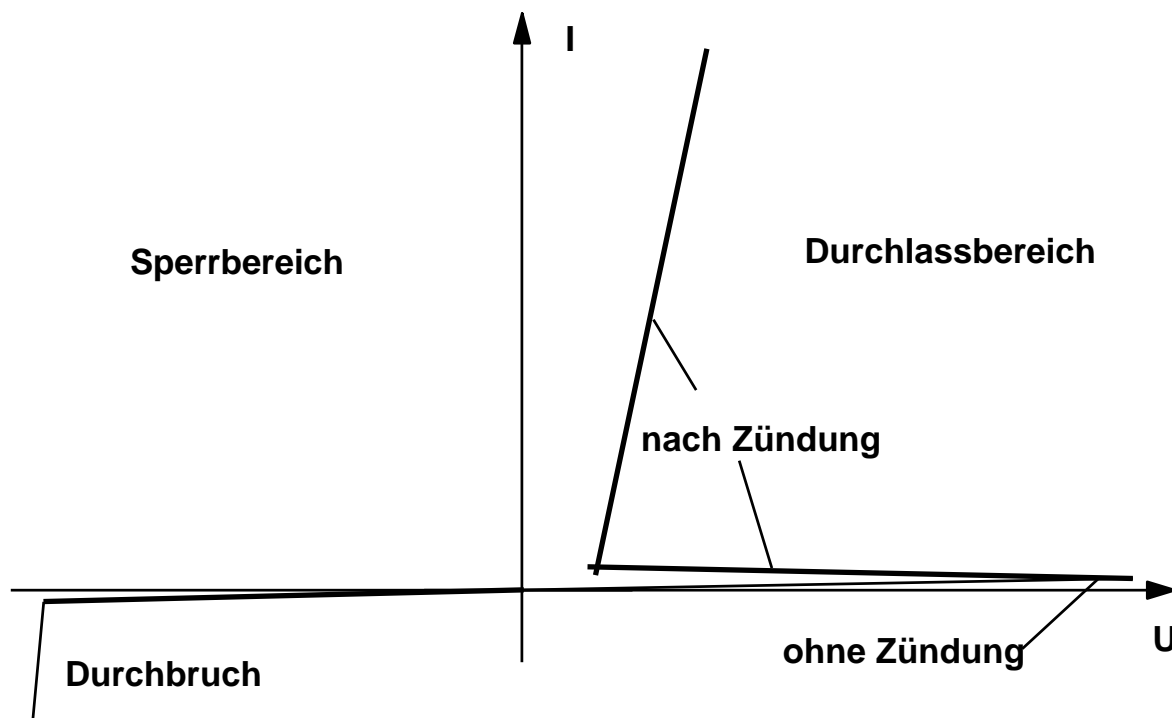
Thyristor

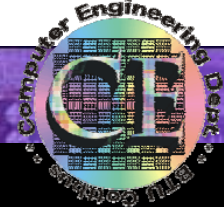


- Flußrichtung +
- + Sperrichtung -

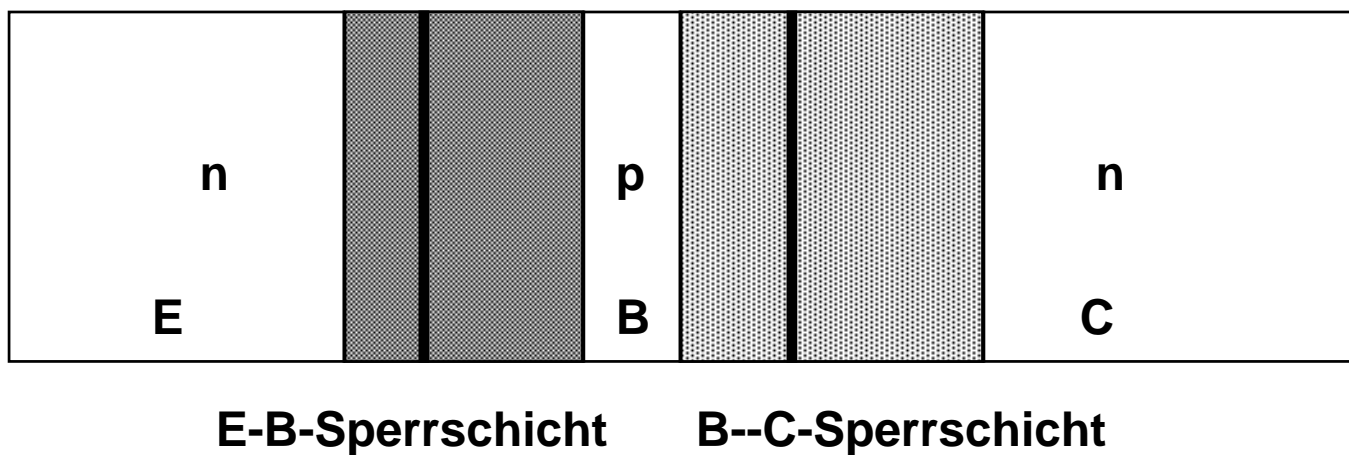


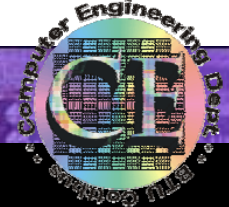
Thyristor-Kennlinie



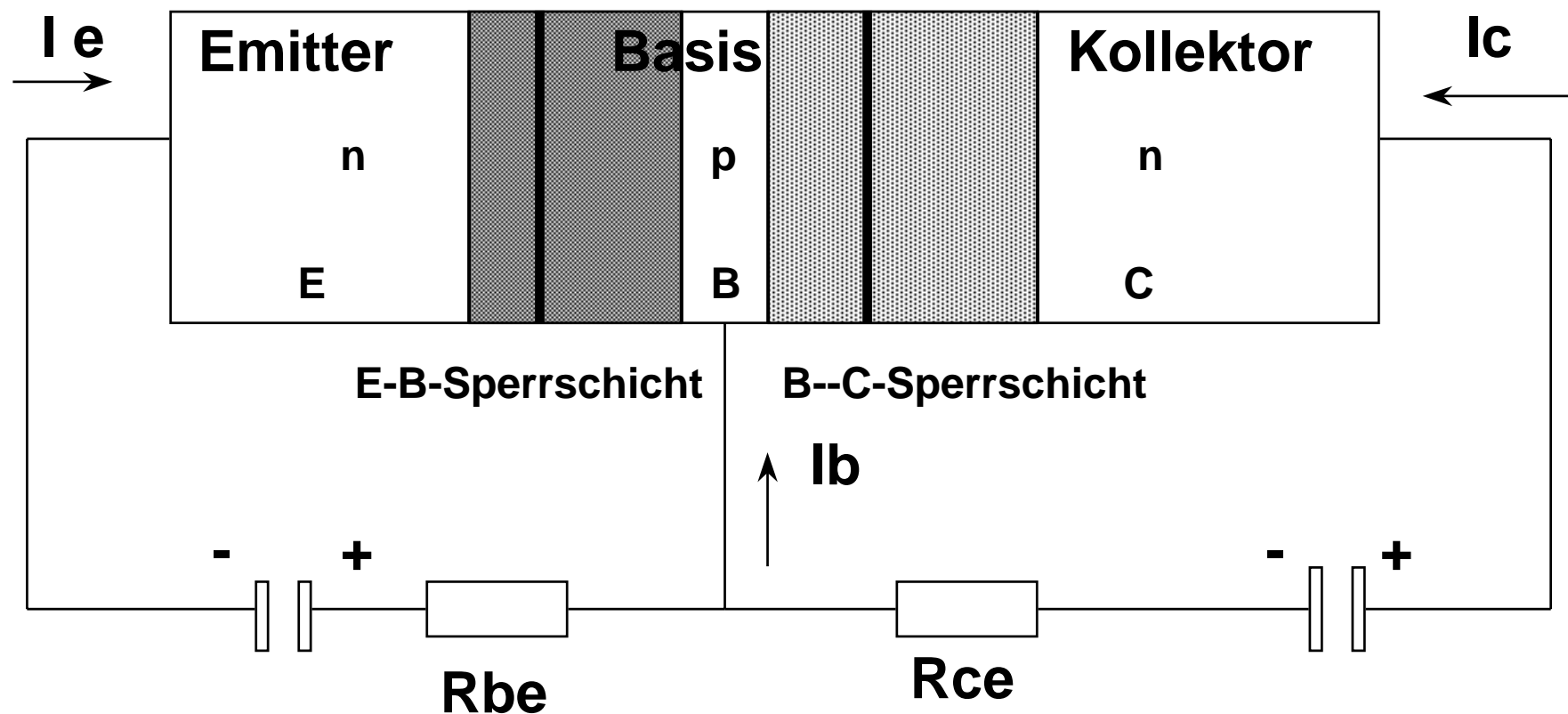


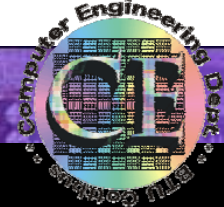
Bipolare Transistor-Struktur



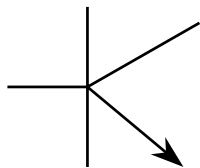


Bipolarer Transistor mit äußerer Beschaltung

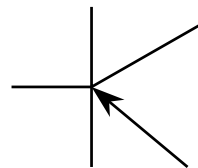




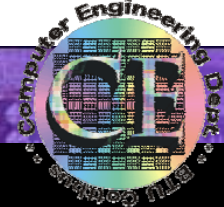
Transistor-Schaltzeichen für bipolare Transistoren



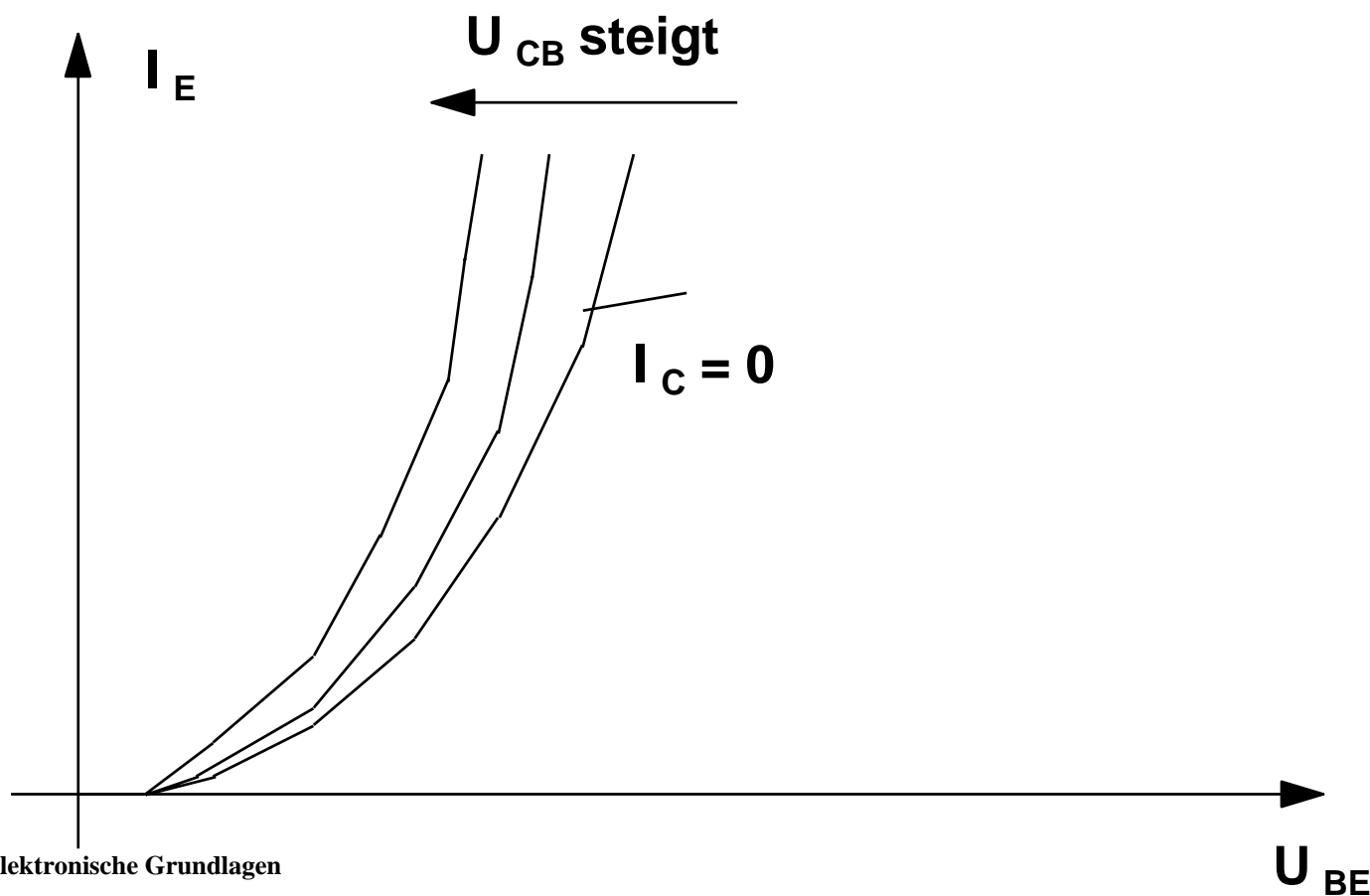
npn-Transistor

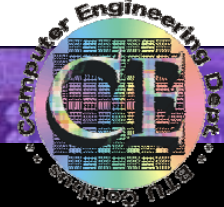


pnp-Transistor

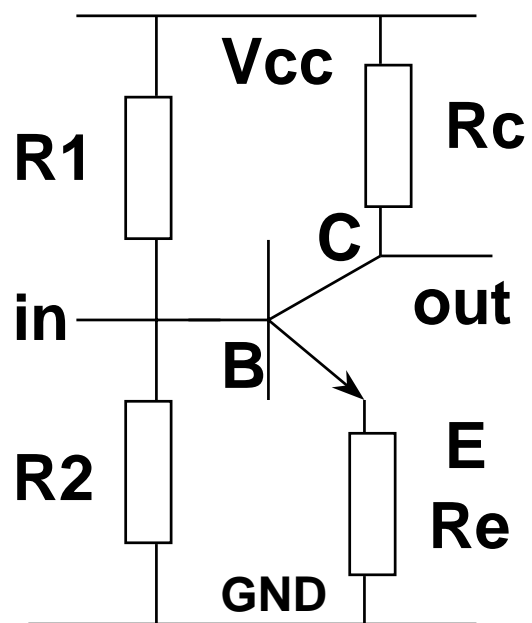


Eingangskennlinie des bipolaren Transistors

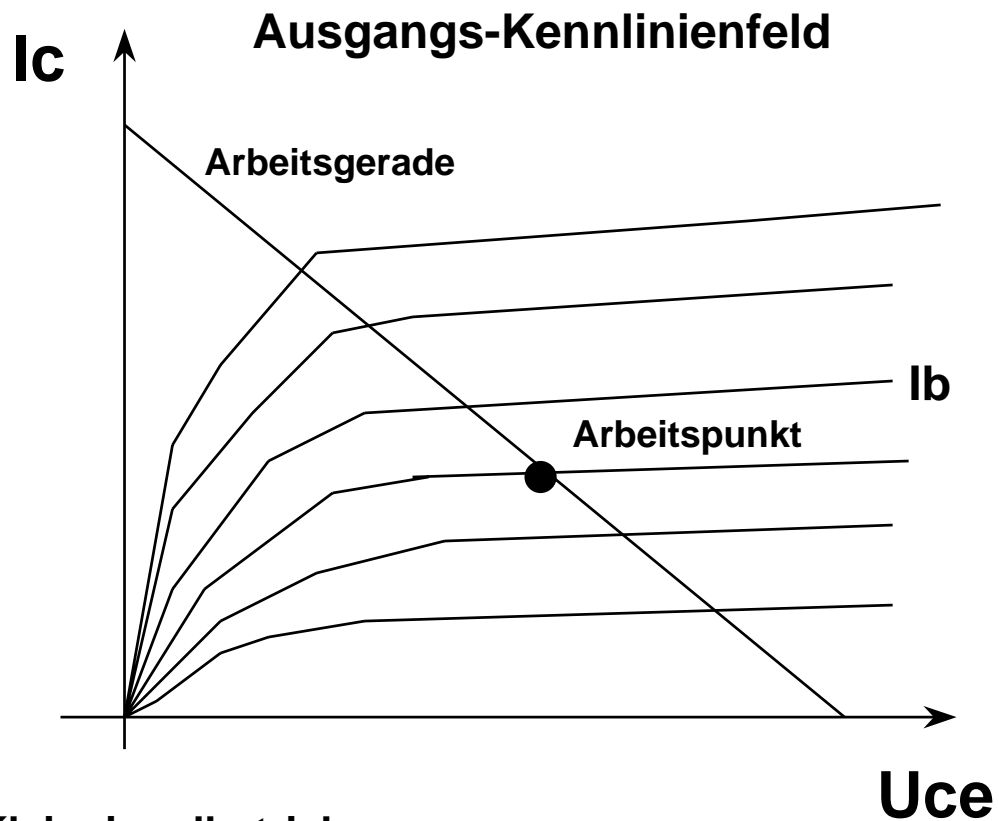


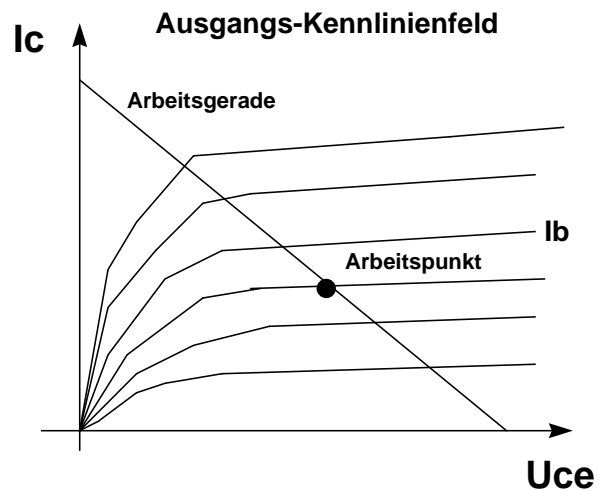
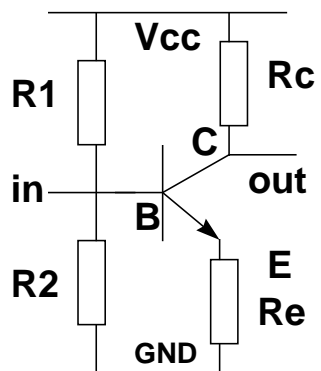
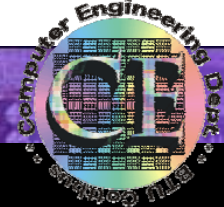


Arbeitspunkt-Einstellung



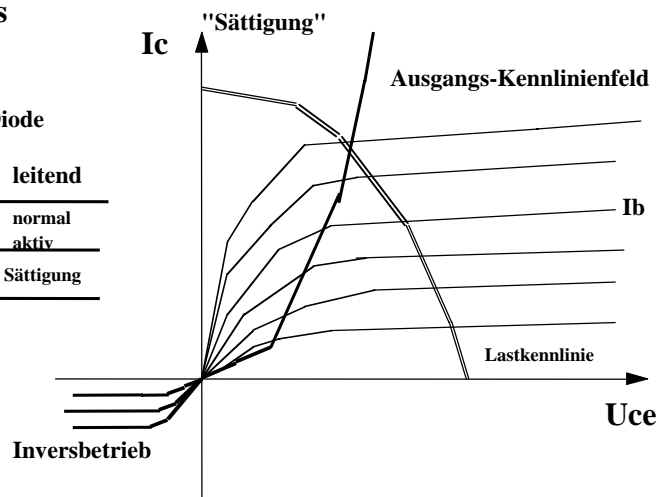
Arbeitspunkt-Einstellung für Kleinsignalbetrieb

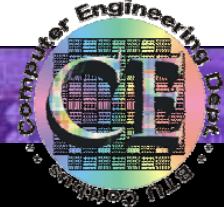




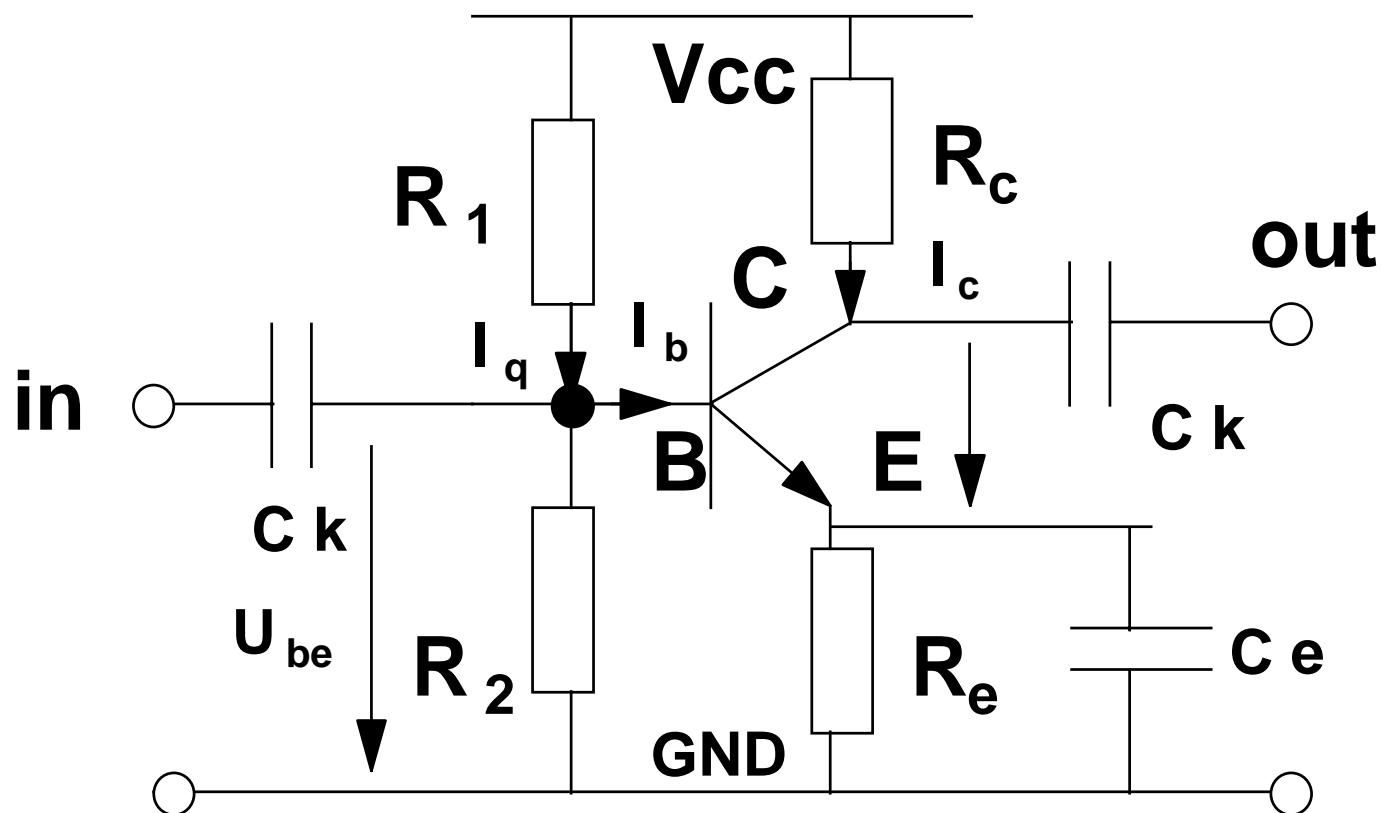
Arbeitsmodus des Transistors

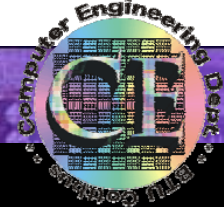
BE-Diode		
CB-Diode	gesp.	leitend
gesp.	inaktiv	normal aktiv
leitend	invers aktiv	Sättigung



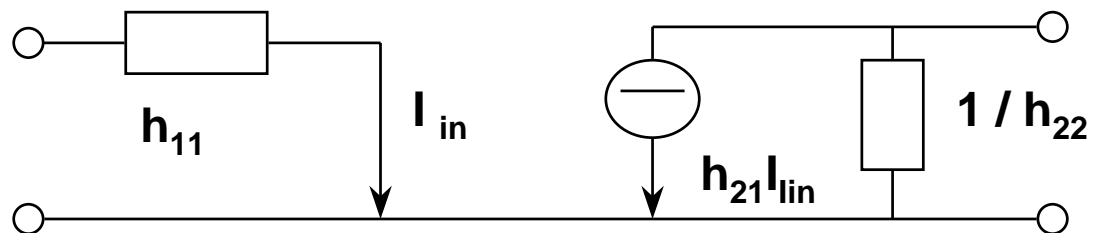


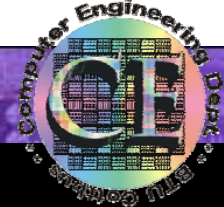
Kleinsignalverstärker in Emitterschaltung





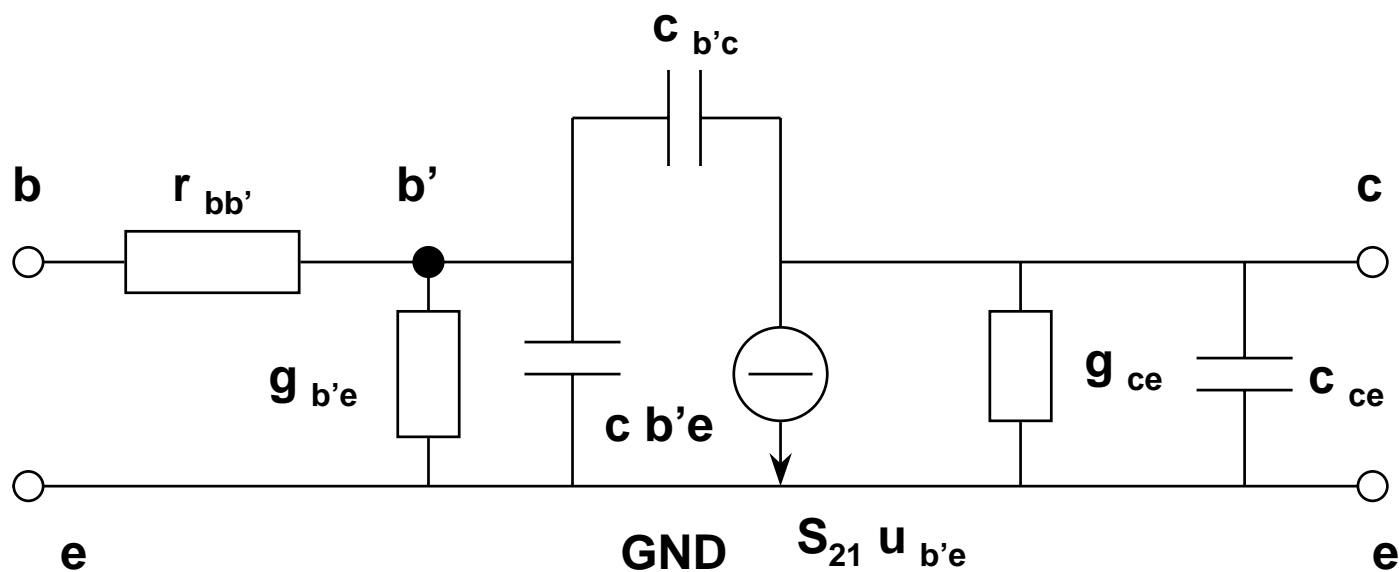
Kleinsignal-Ersatzschaltbild - NF

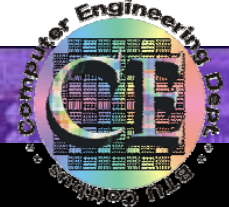




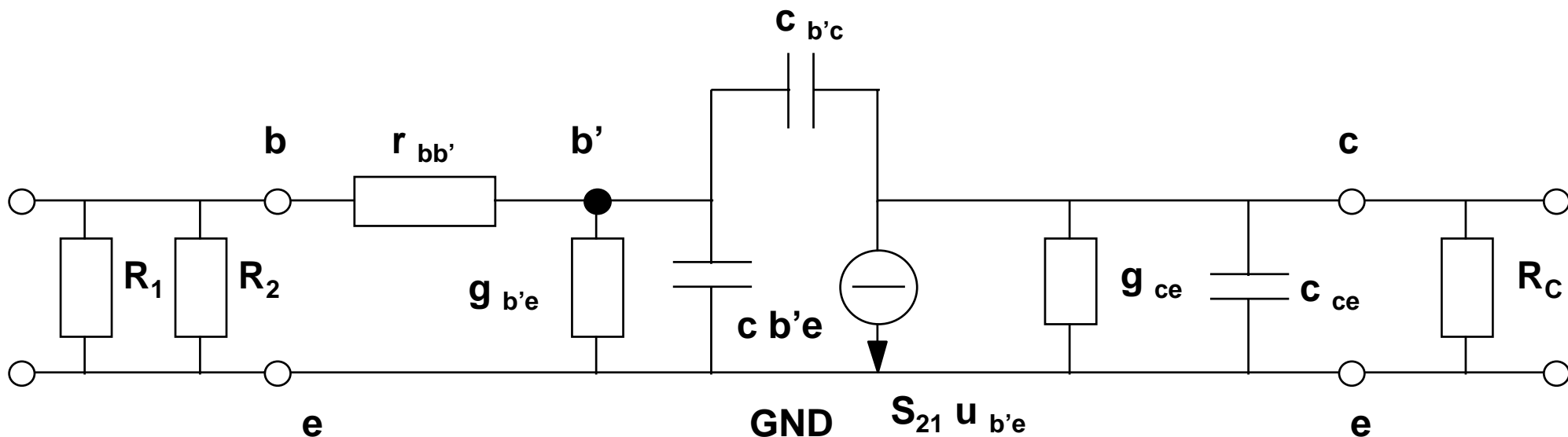
Kleinsignal-Ersatzschaltbild HF

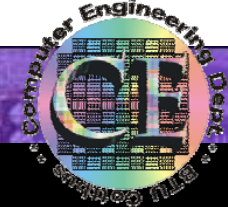
des bipolaren Transistors in Emitterschaltung





Verstärker mit Transistor in Emitterschaltung bei höheren Frequenzen

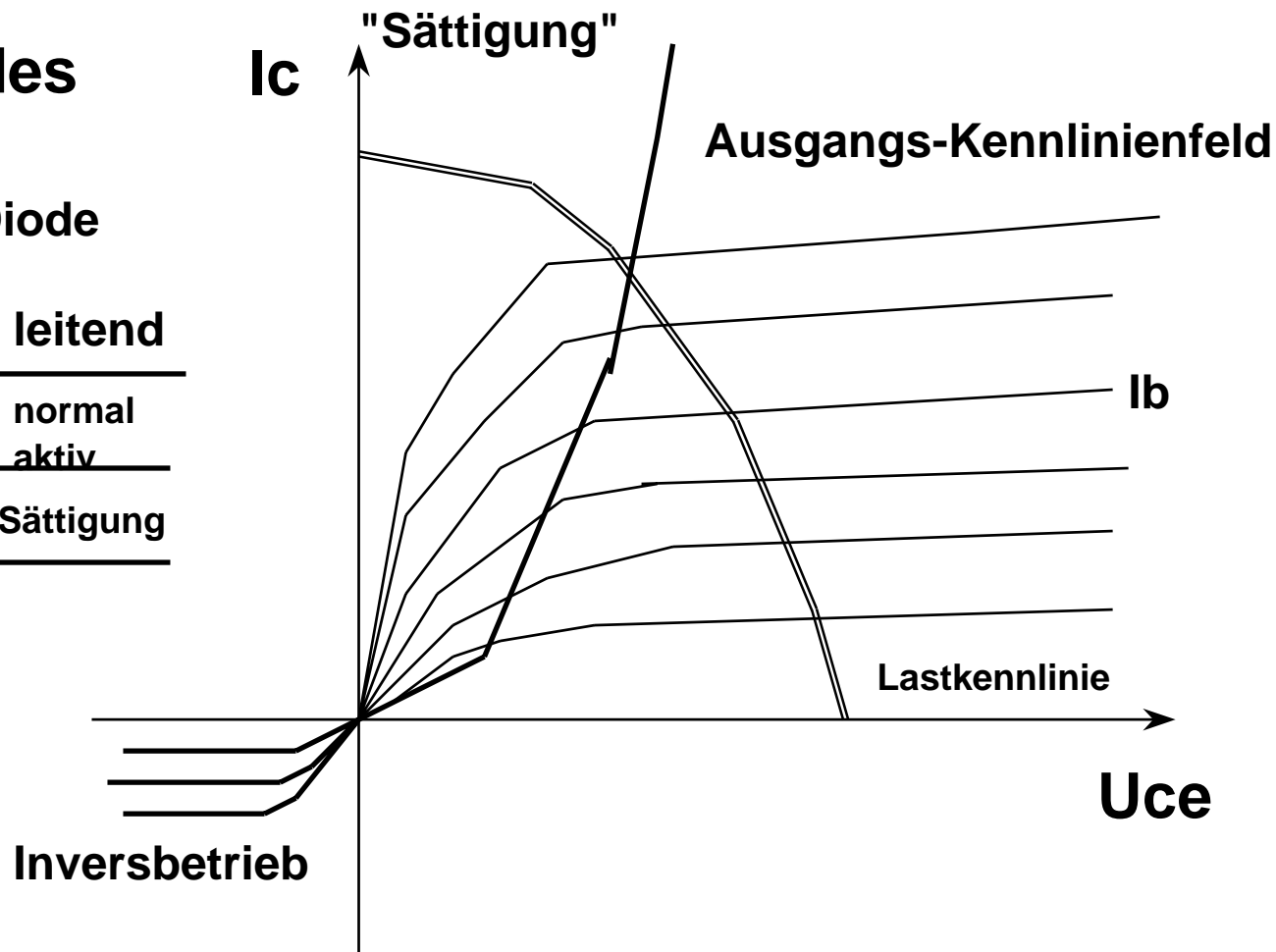


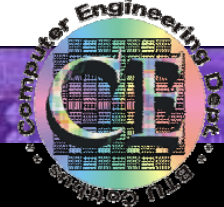


Großsignalbetrieb

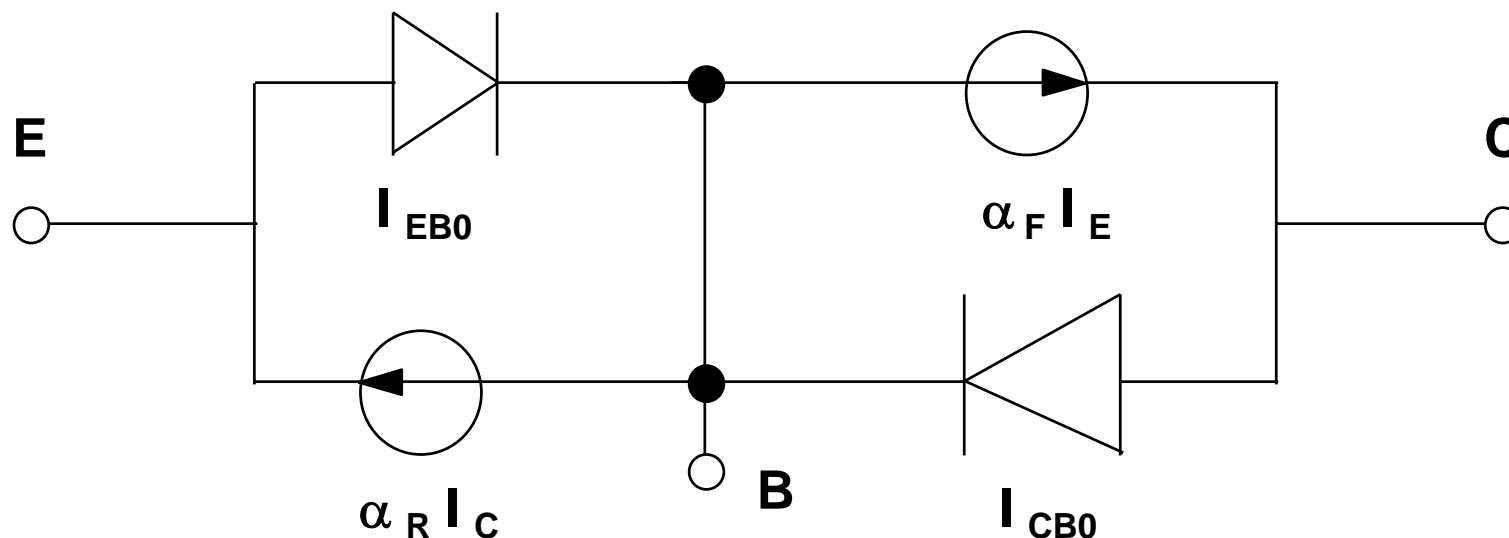
Arbeitsmodus des Transistors

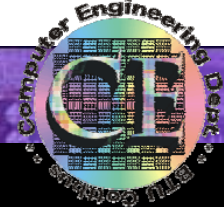
		BE-Diode	
CB-Diode		gesp.	leitend
gesp.		inaktiv	normal aktiv
leitend		invers aktiv	Sättigung



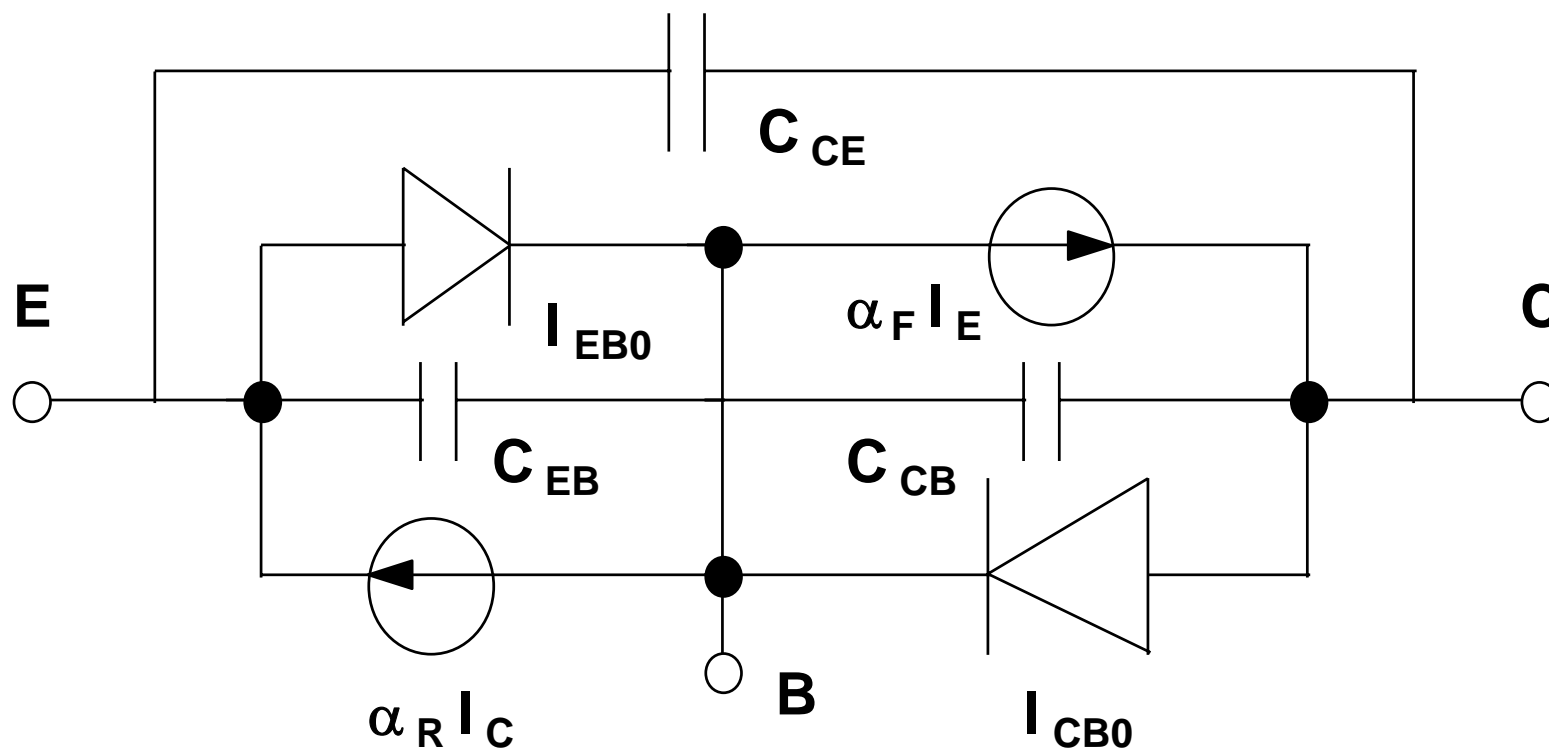


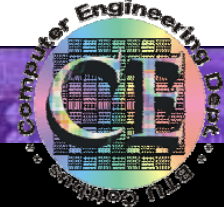
Ebers-Moll-Ersatzschaltung



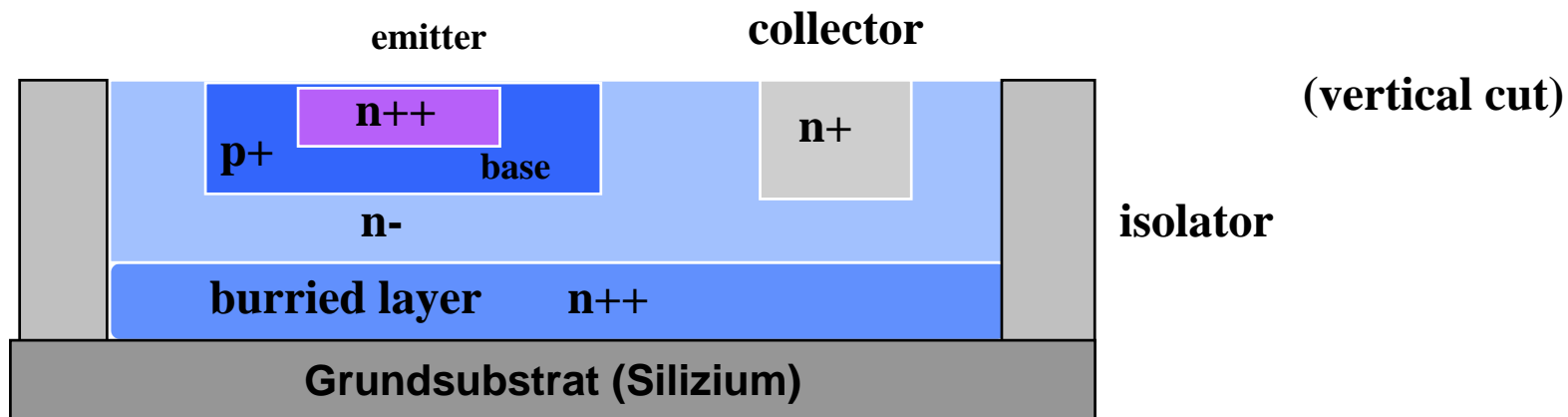


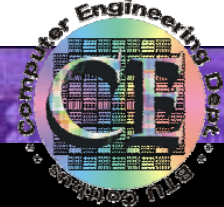
Großsignal-Ersatzschaltung für höhere Frequenzen



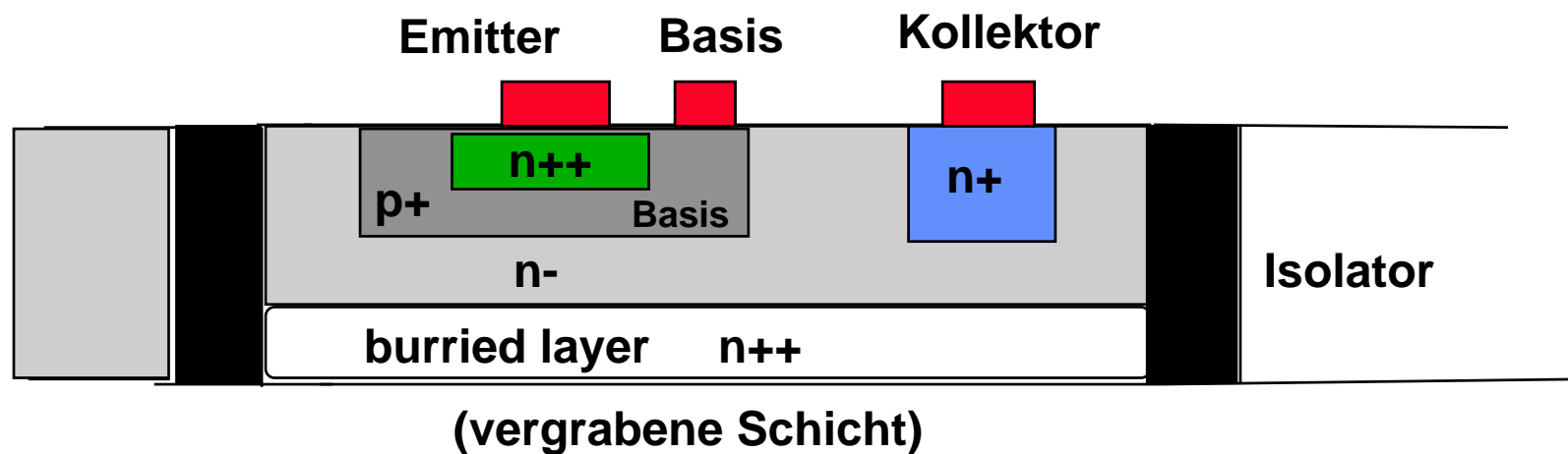


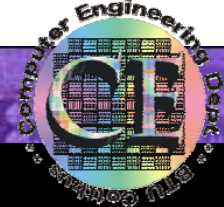
Integrierter Bipolarer Transistor



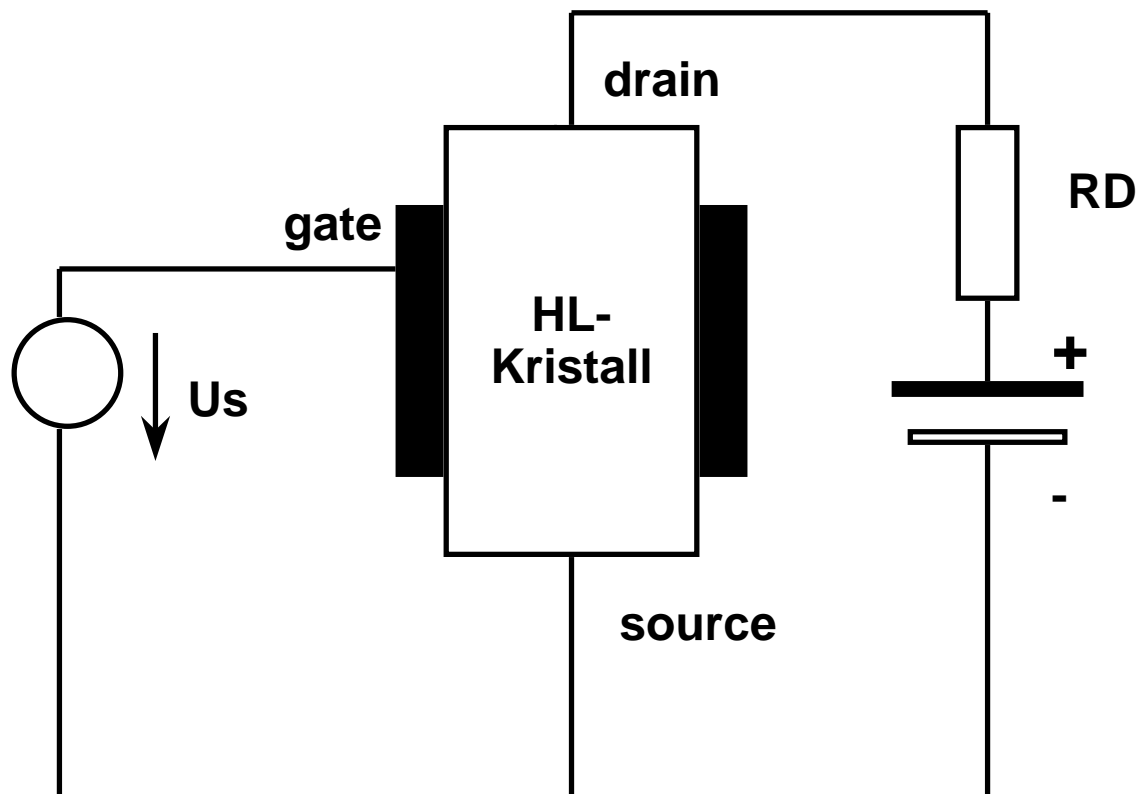


Integrierter Bipolarer Transistor



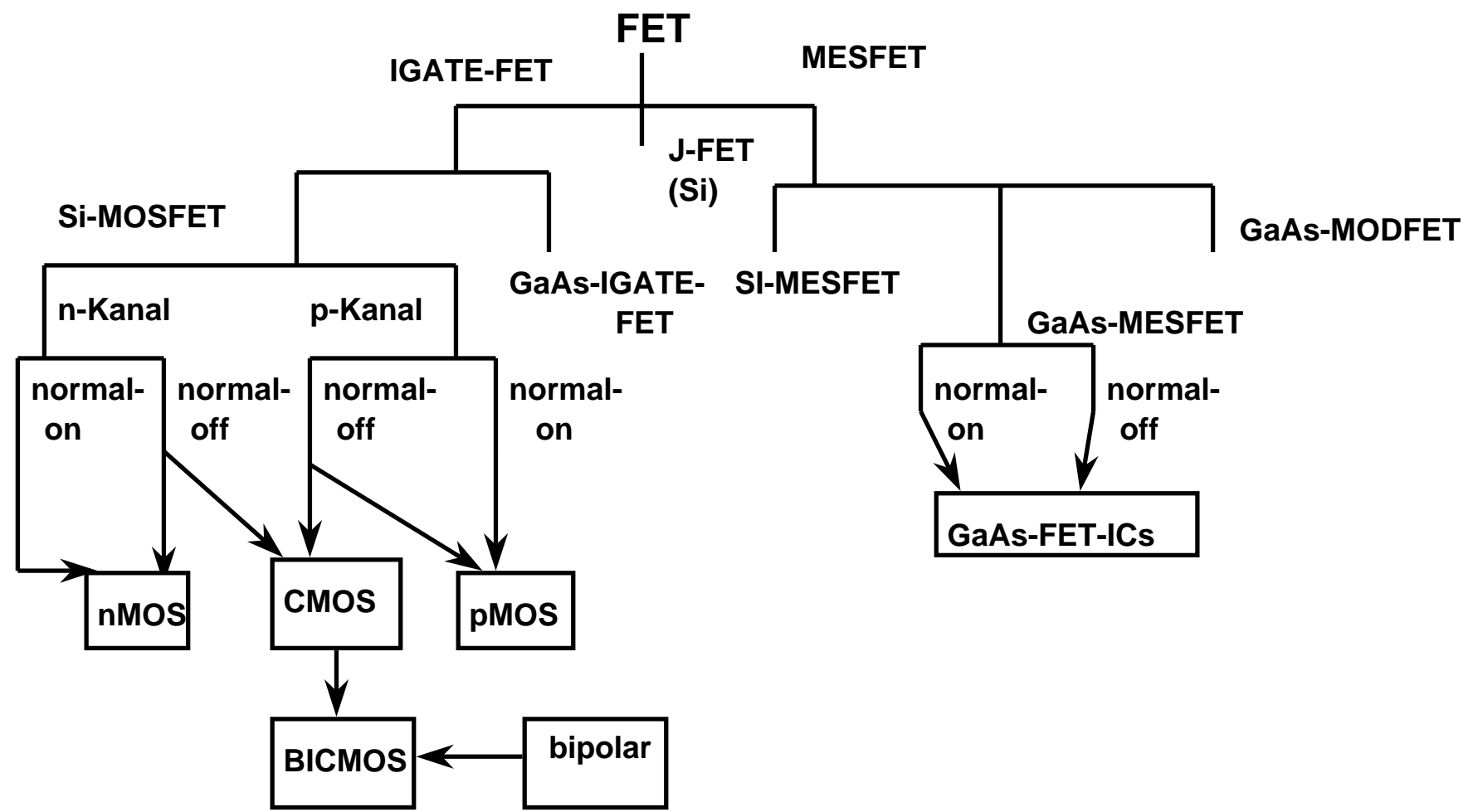


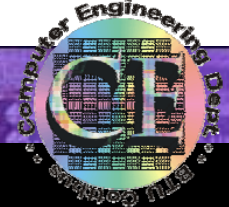
Feldeffekt-Transistor



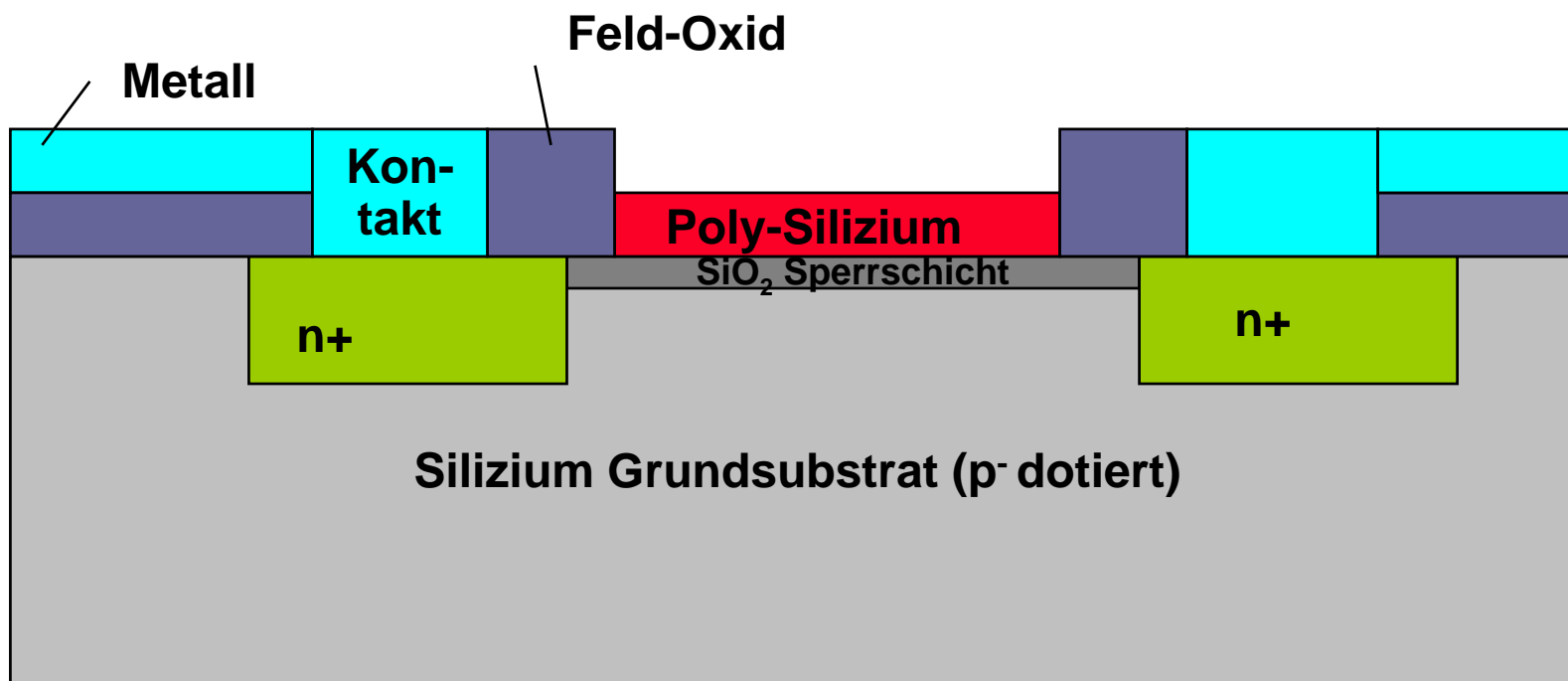


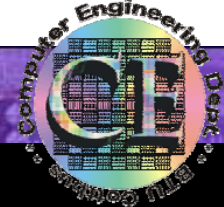
Stammbaum der FETs



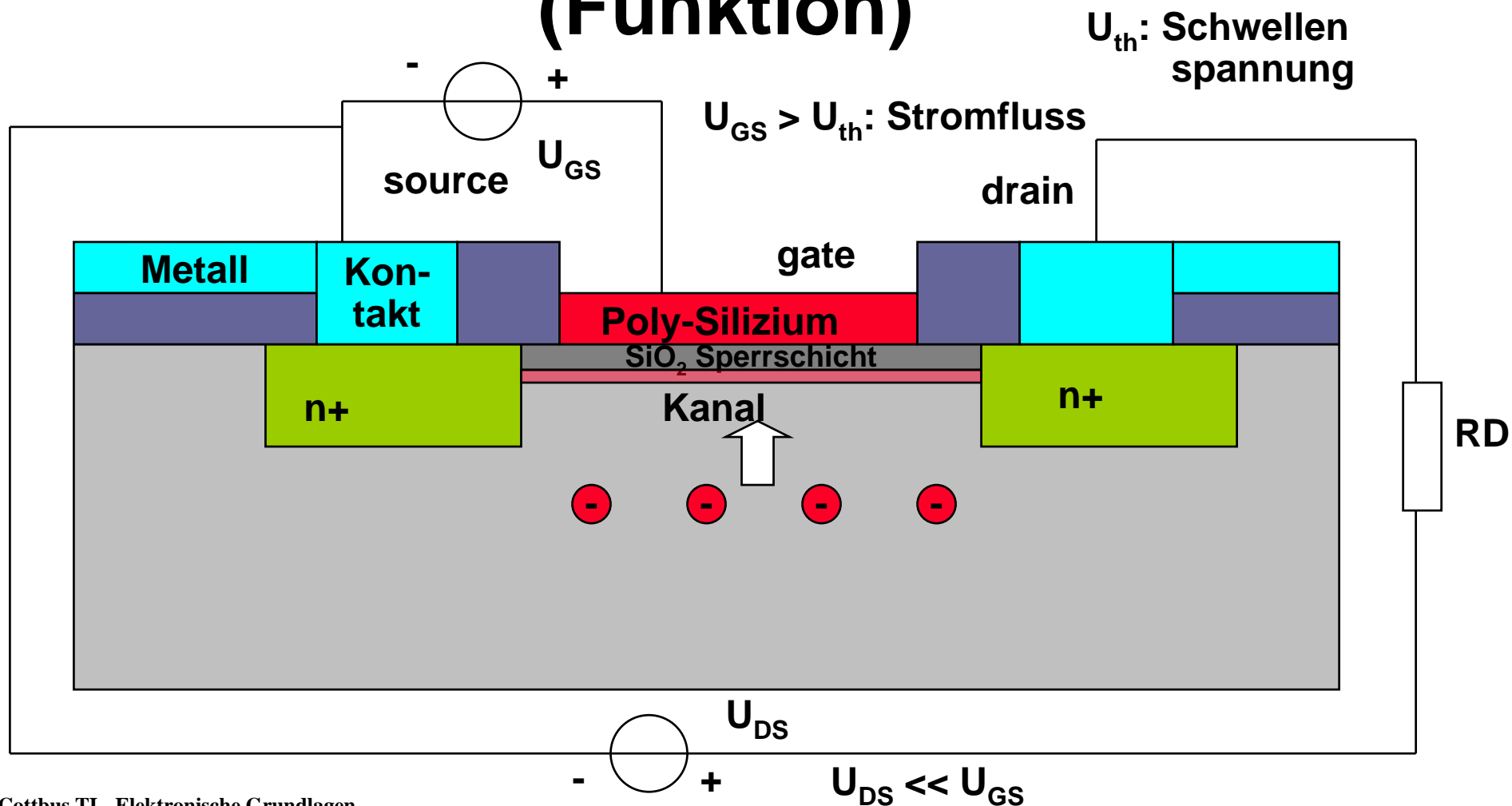


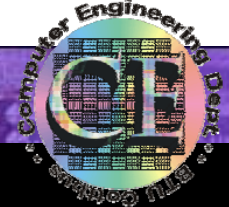
n-Kanal-MOS-Transistor (Schnitt)





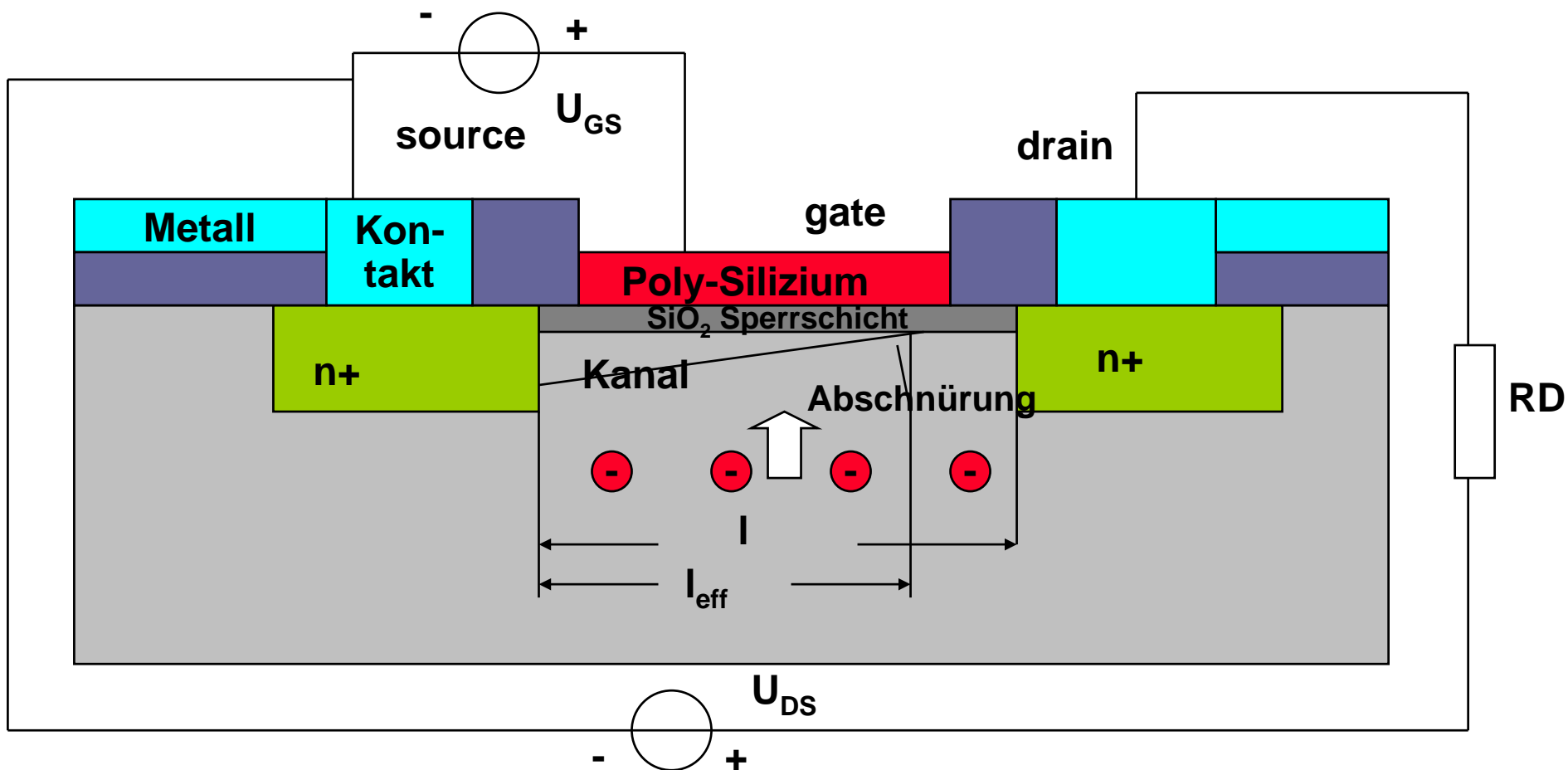
n-Kanal MOS-Transistor (Funktion)

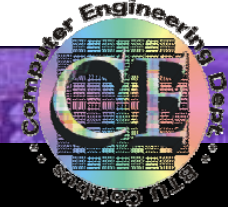




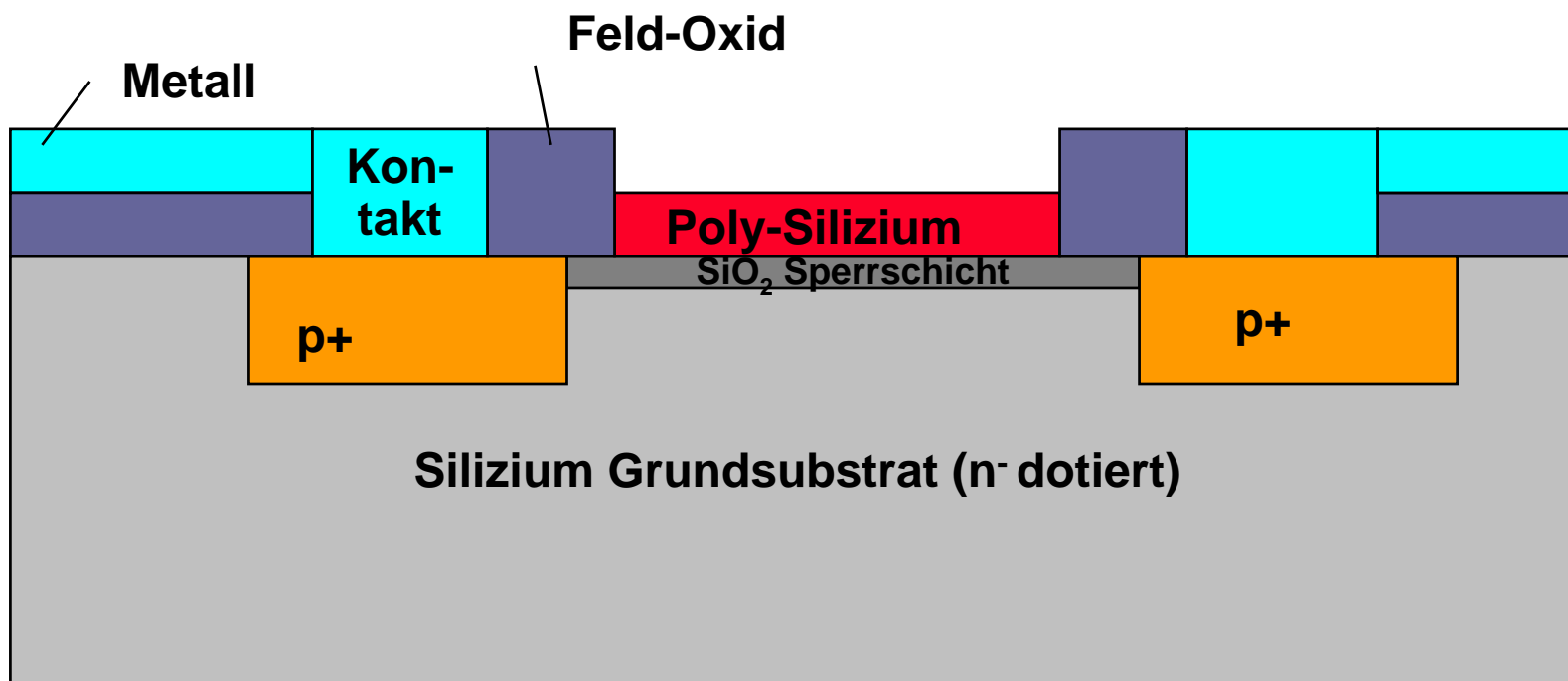
n-Kanal MOS-Transistor: Abschnürung

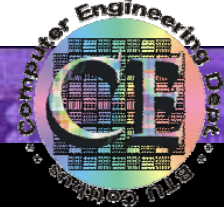
$$U_{DS} > U_{GS}$$



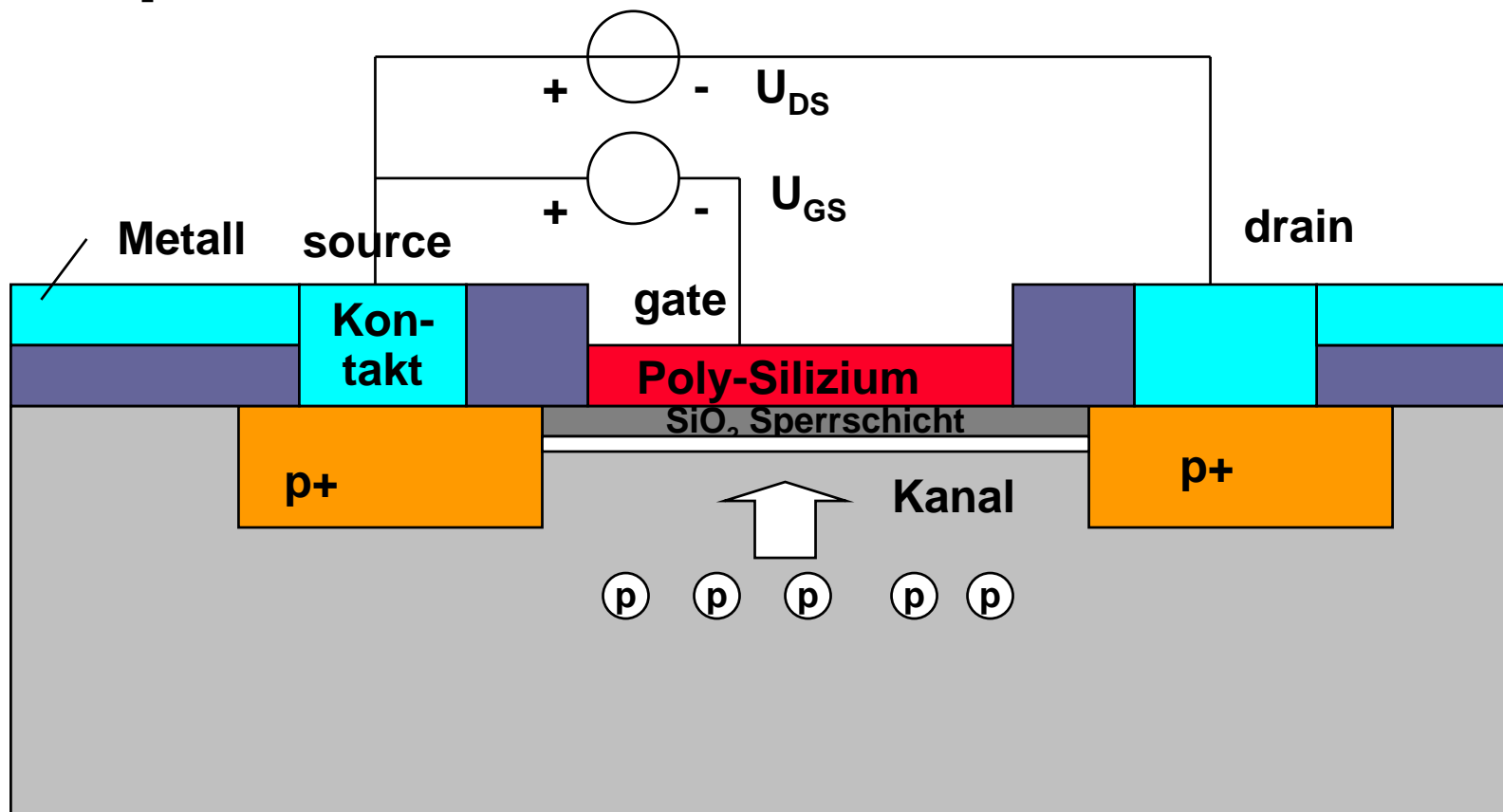


p-Kanal MOS-Transistor

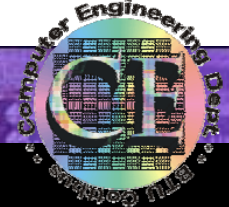




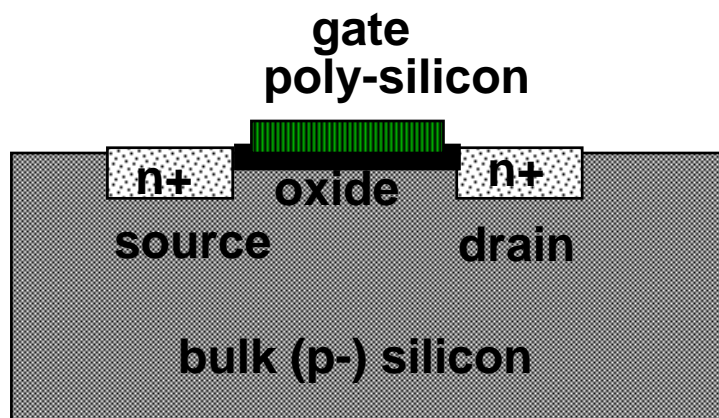
p-Kanal MOS-Transistor, Funktion



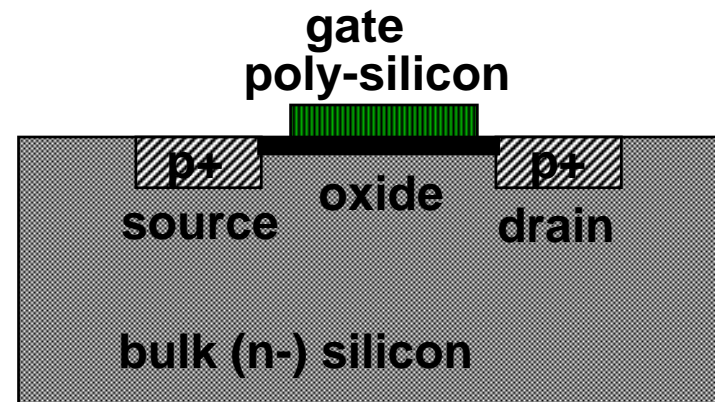
Strom fließt, wenn die Gate-Elektrode gegenüber dem Kanal eine mindestens um U_{th} niedrigere Spannung hat !



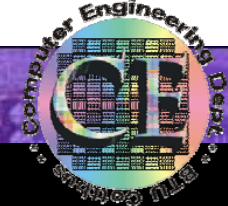
Struktur des integrierten MOS-Transistors



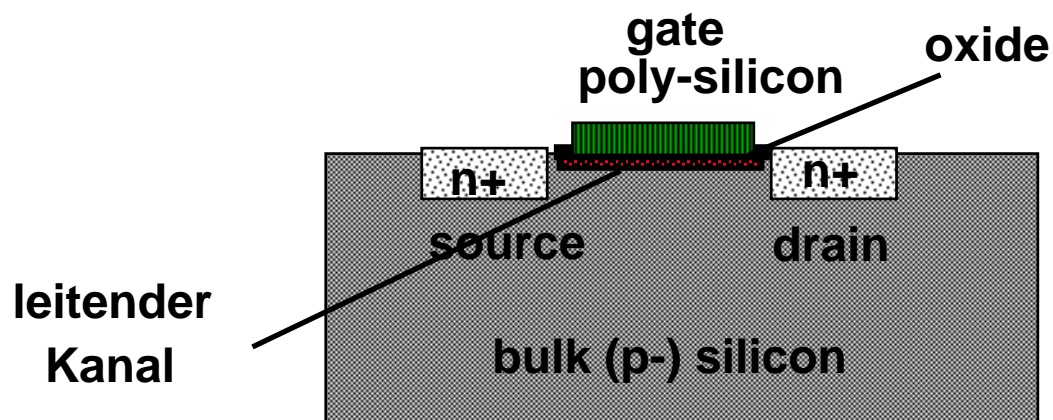
n-channel enhancement MOS
transistor



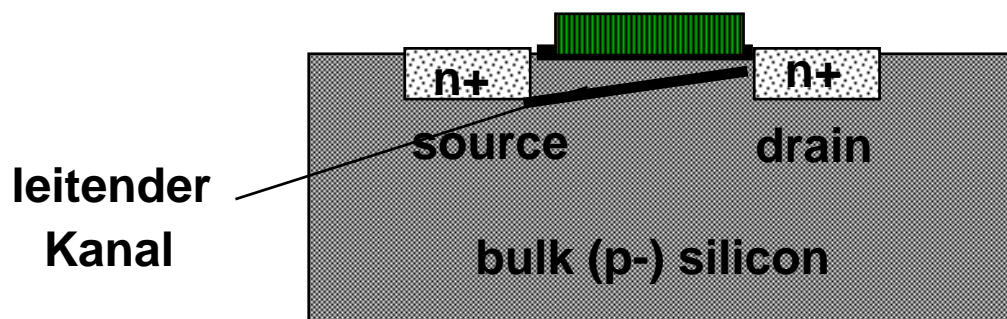
p-channel enhancement
transistor



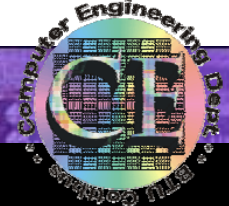
MOS-Transistor: Kanal und Abschnüreffekt



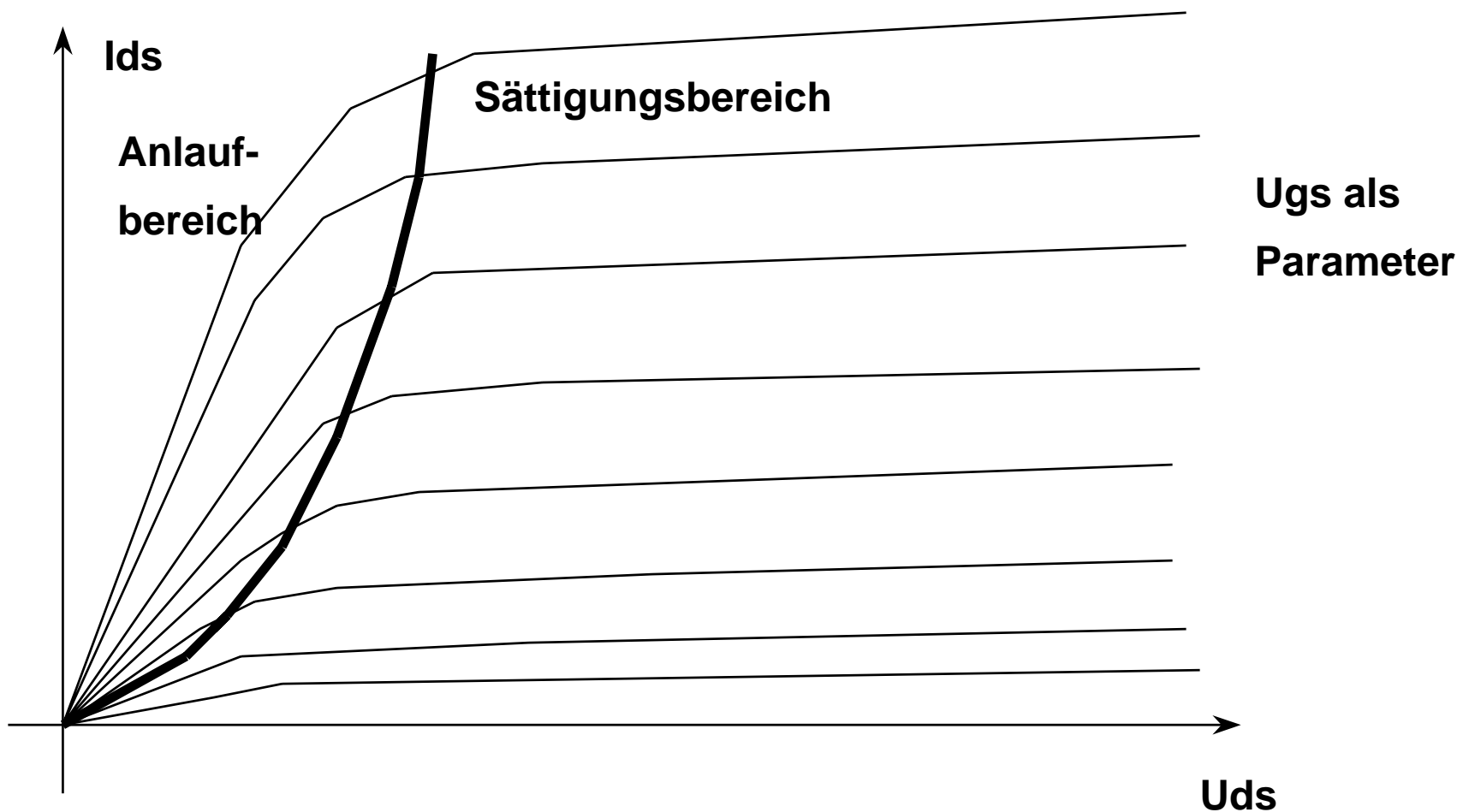
$$U_{gs} \gg U_{ds}$$



$$U_{gs} = U_{ds}$$



Ausgangskennlinien des MOS-Transistors

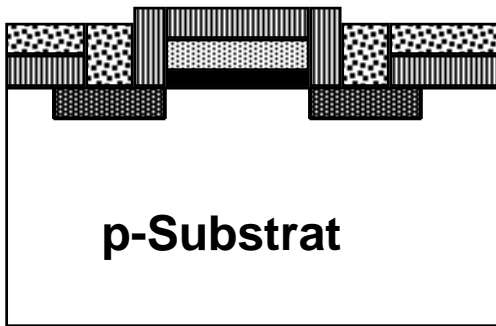




n-Kanal-Typen

selbstsperrend

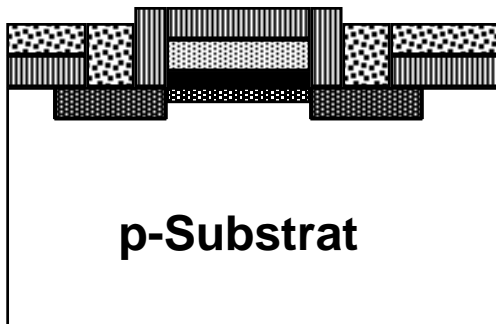
$U_{ds} > 0, U_{gs} > 0$



p-Substrat

selbstleitend

$U_{ds} > 0, U_{gs} < 0$

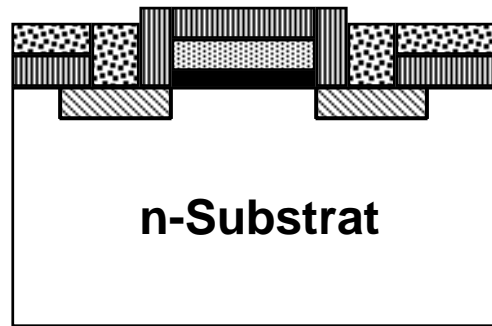


p-Substrat

p-Kanal-Typen

selbstsperrend

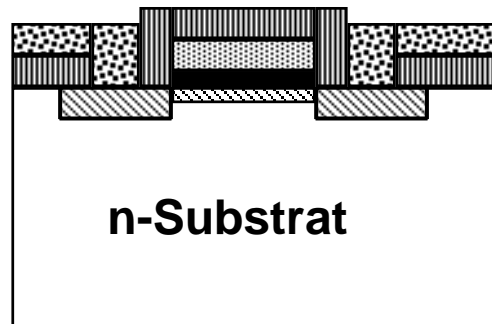
$U_{ds} < 0, U_{gs} < 0$









n-Substrat

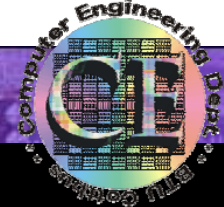
selbstleitend

$U_{ds} < 0, U_{gs} > 0$

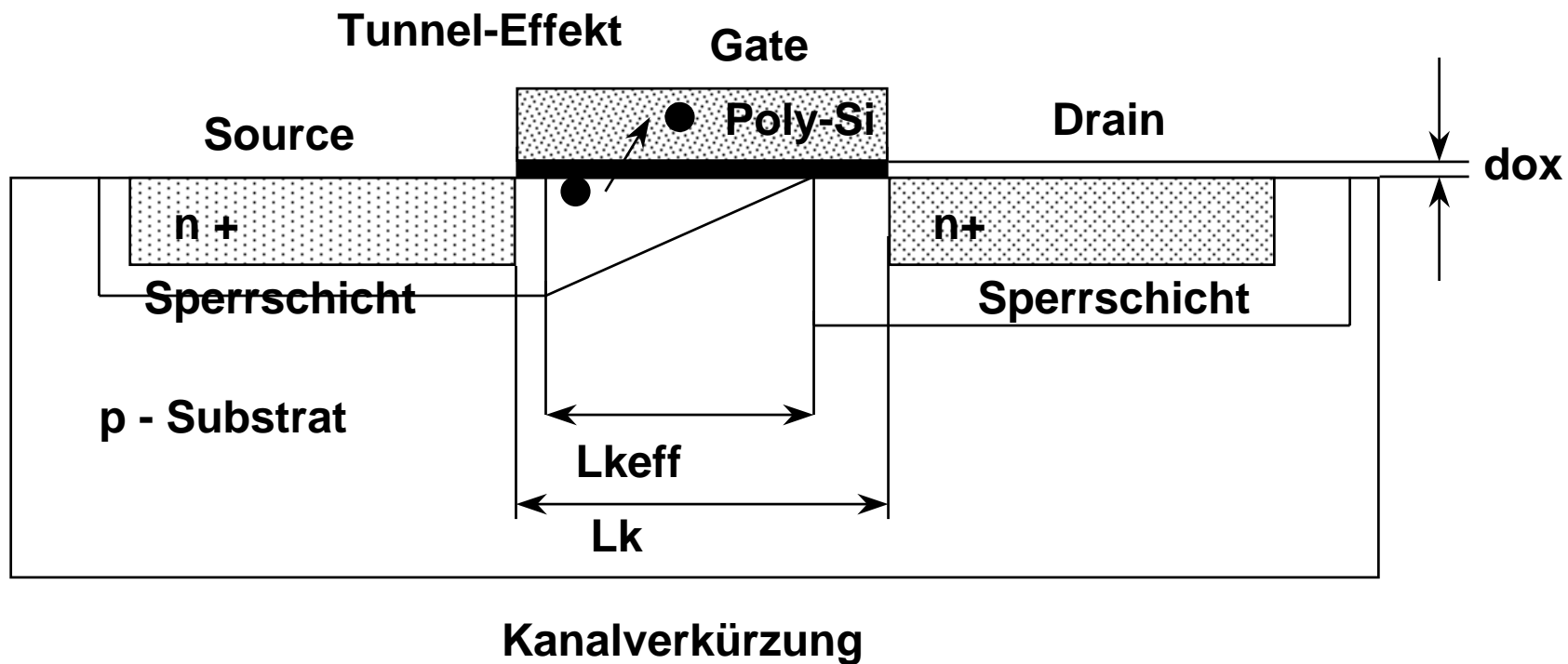


n-Substrat

-  n-Diffusion
-  p-Diffusion
-  Polysilizium
-  Gate-Oxid
-  Feldoxid
-  Metall

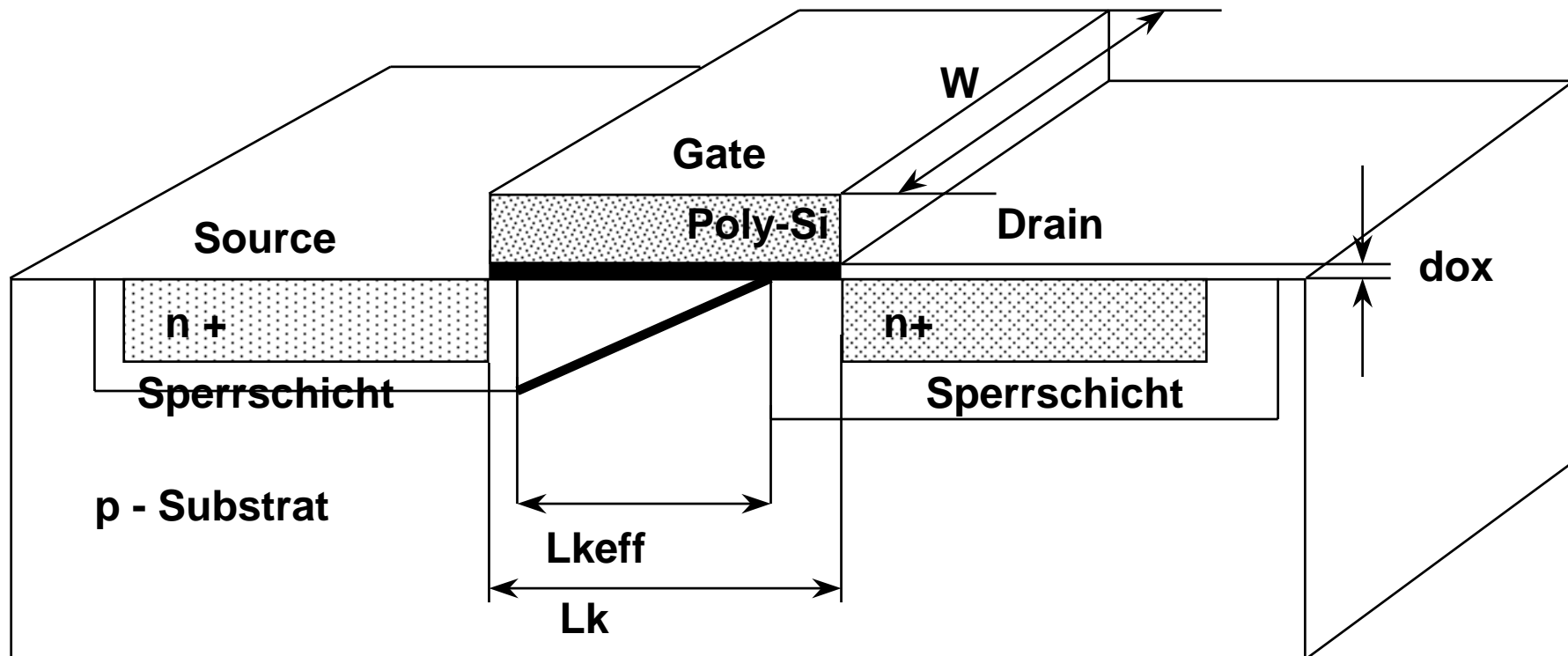


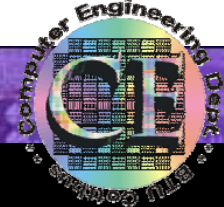
Kurzkanal-Effekte



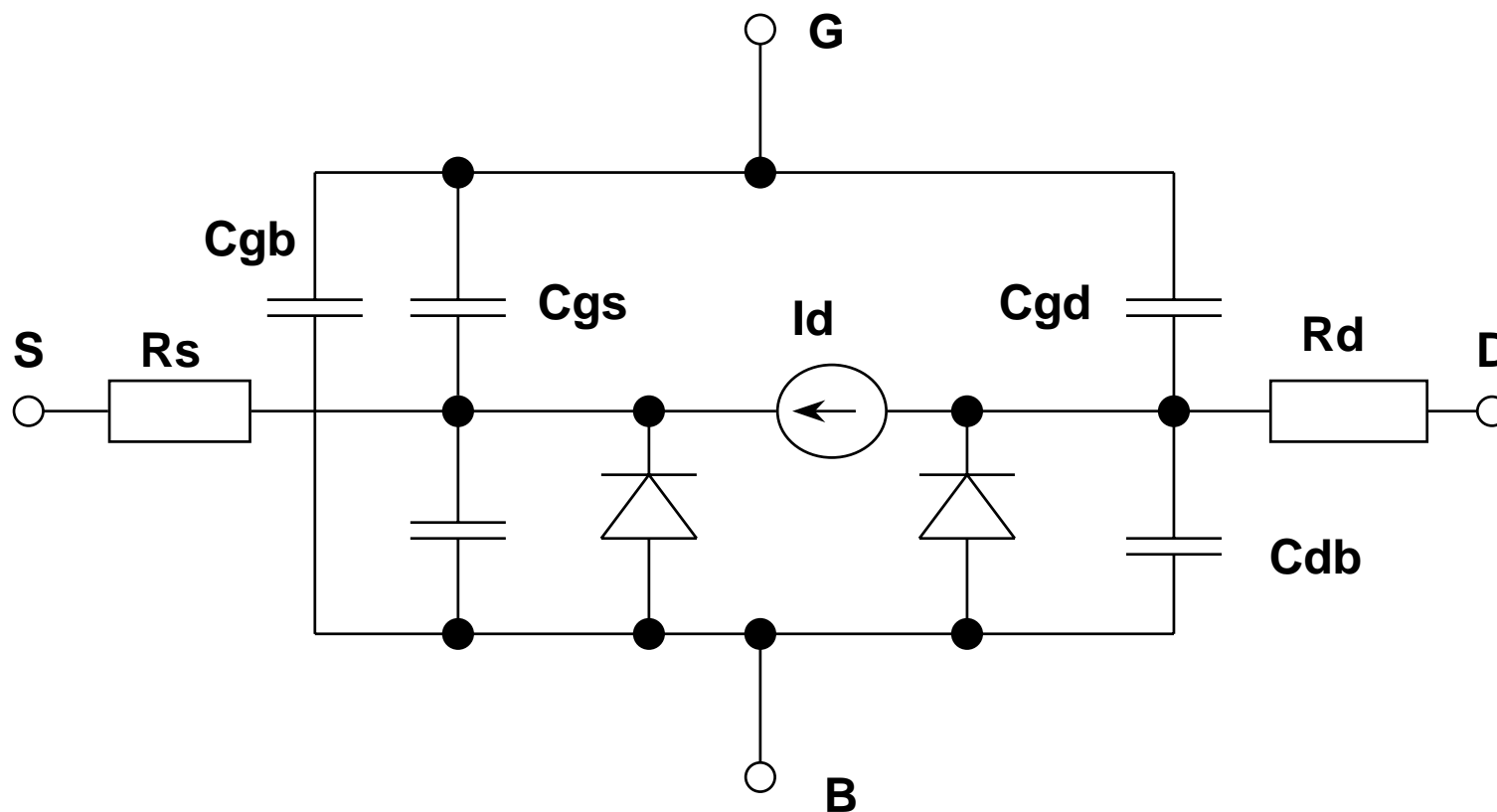


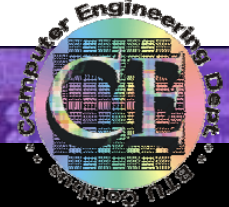
Struktur des MOS-Transistors



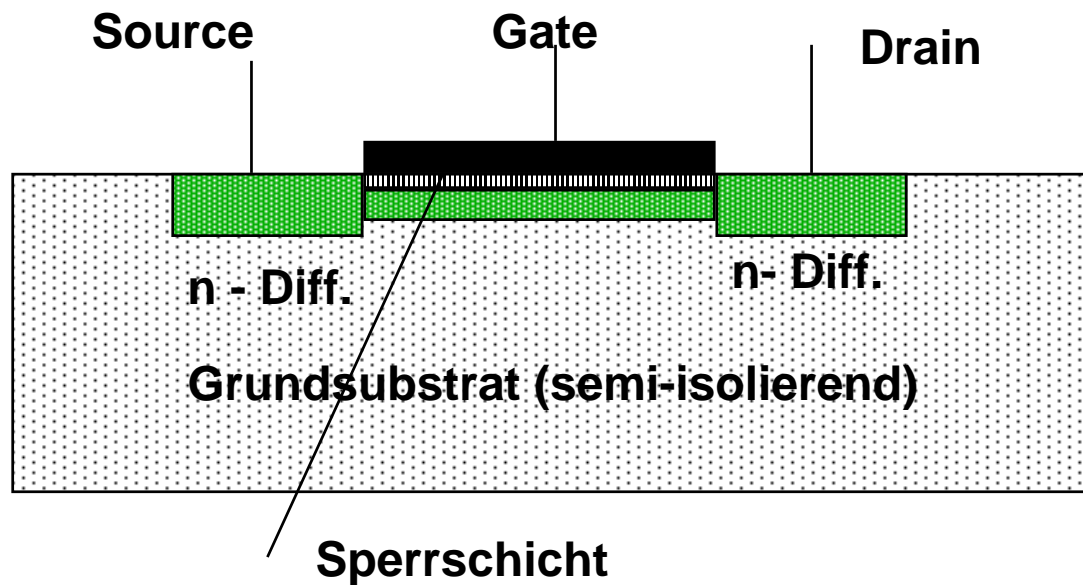


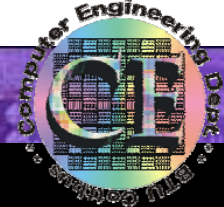
Ersatzschaltbild des MOS-Transistors





Struktur eines MESFET





Recessed-Gate-MESFET

