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**Verbundprojekt:**

**Aufwandsgünstige Realisierung von hochperformanten OFDM-Systemen mit  
partieller Kanalkennntnis**

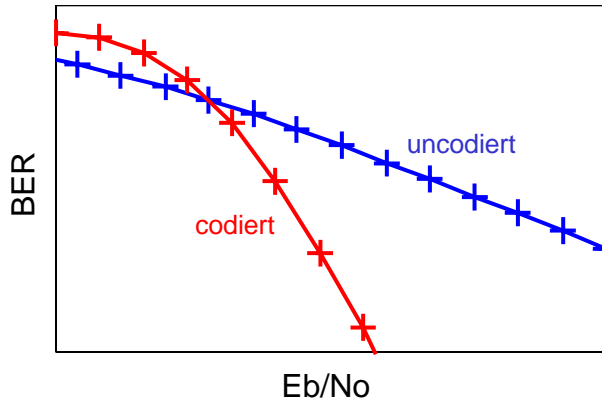
# **Differential Space-Time Block Codes in codierten MIMO-OFDM Übertragungs- systemen**

Christian Fellenberg

20.Februar 2008

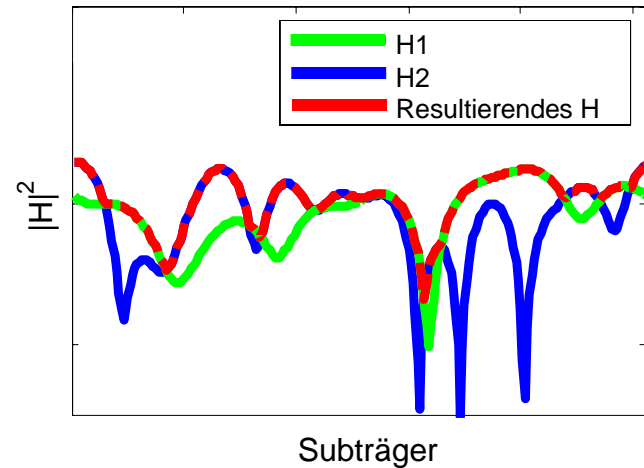
Institut für Nachrichtentechnik  
Technische Universität Hamburg-Harburg (TUHH)

## Kanalcodierung



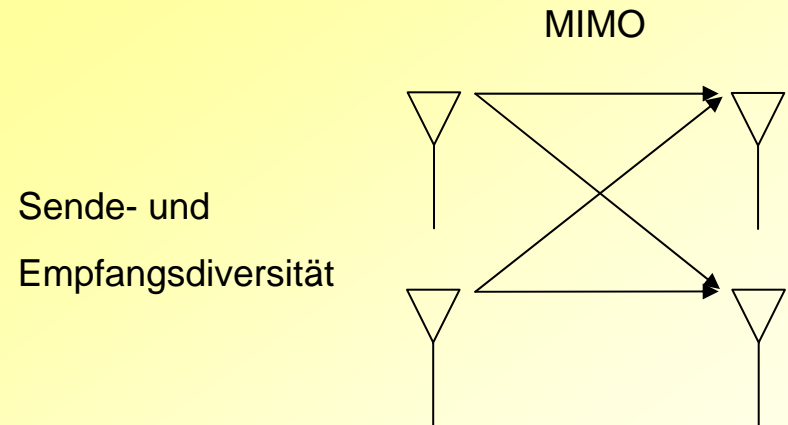
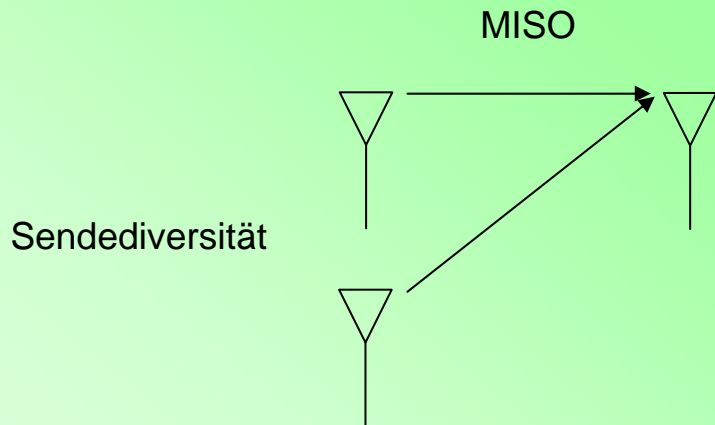
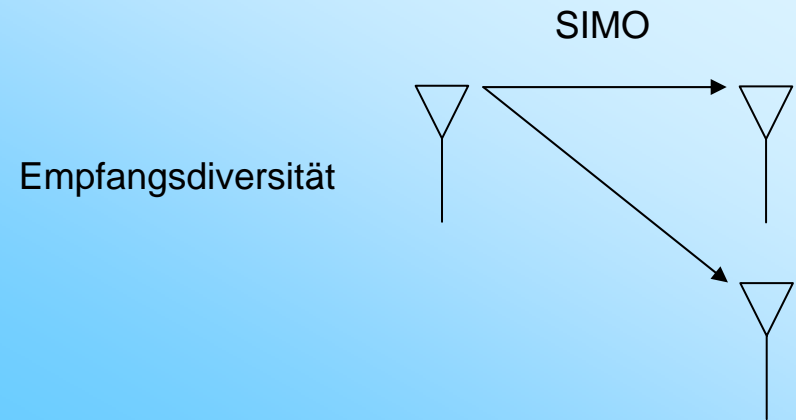
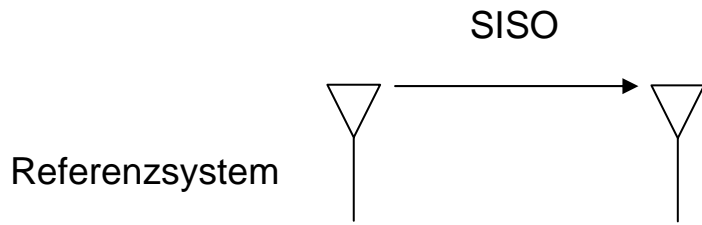
Wie ergänzen sich diese Verfahren?

## Räumliche Diversität



Ziel: Erhöhung der Zuverlässigkeit von nicht kohärenten Übertragungssystemen

# Übertragungssysteme

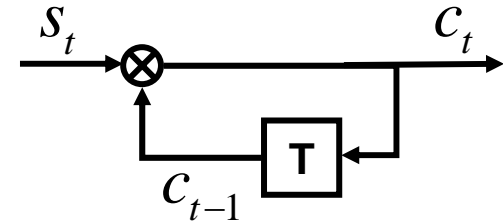


# Differentielle Codierung: DPSK und DSTBC

## DPSK

Informations Symbol:  $s_t$

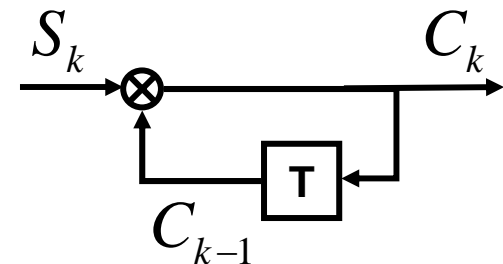
Codierung:  $c_t = s_t c_{t-1}$



## DSTBC

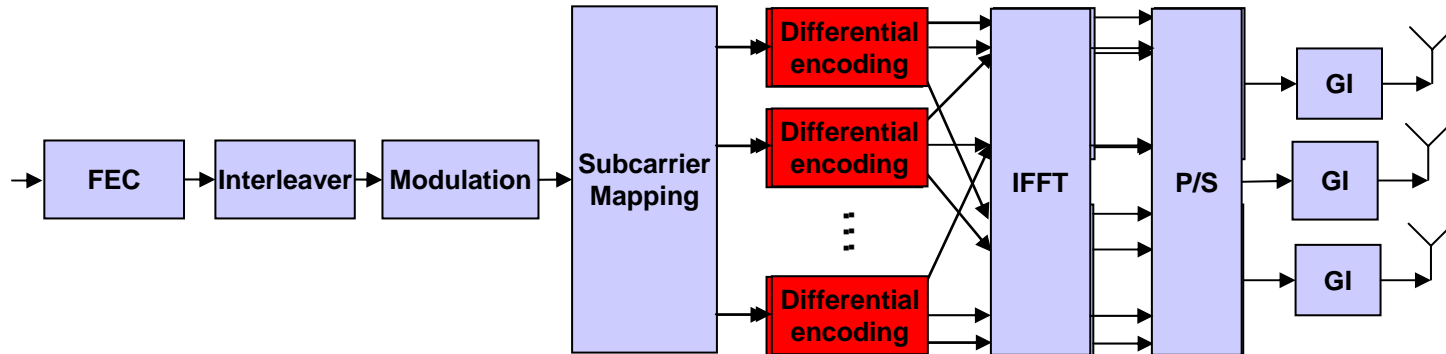
Informations Matrix:  $S_k = \begin{pmatrix} s_{1,k} & s_{2,k} \\ -s_{2,k}^* & s_{1,k}^* \end{pmatrix}$

Codierung:  $C_k = S_k C_{k-1}$

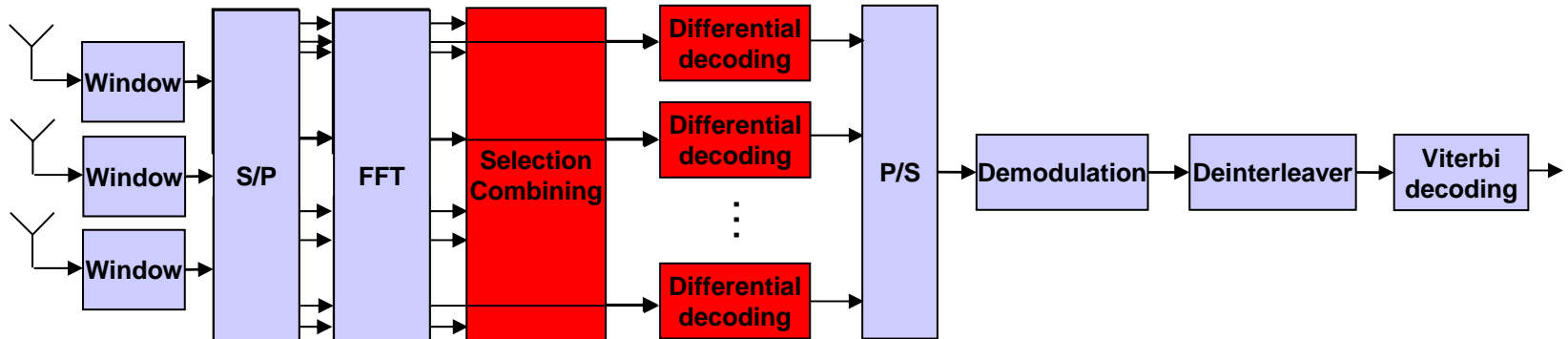


# OFDM Übertragungssysteme

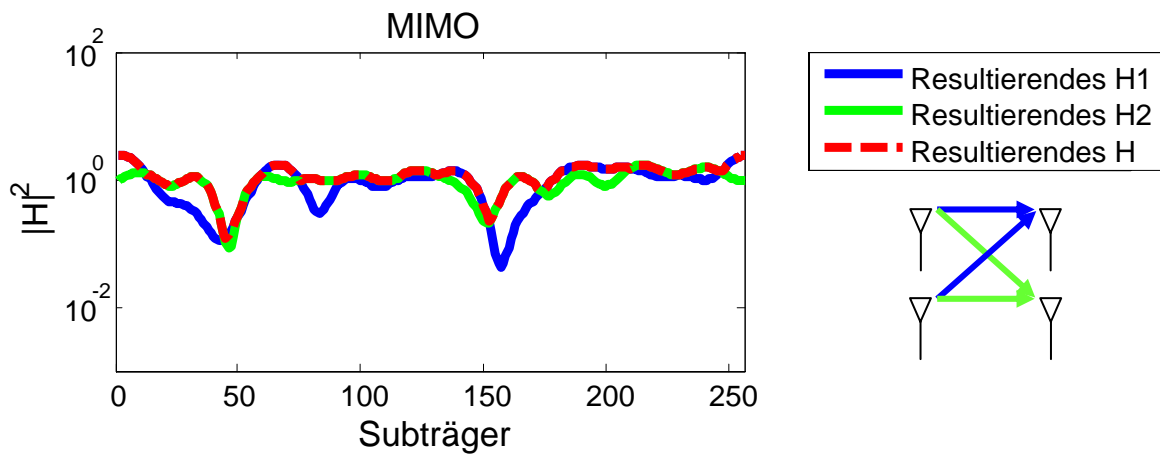
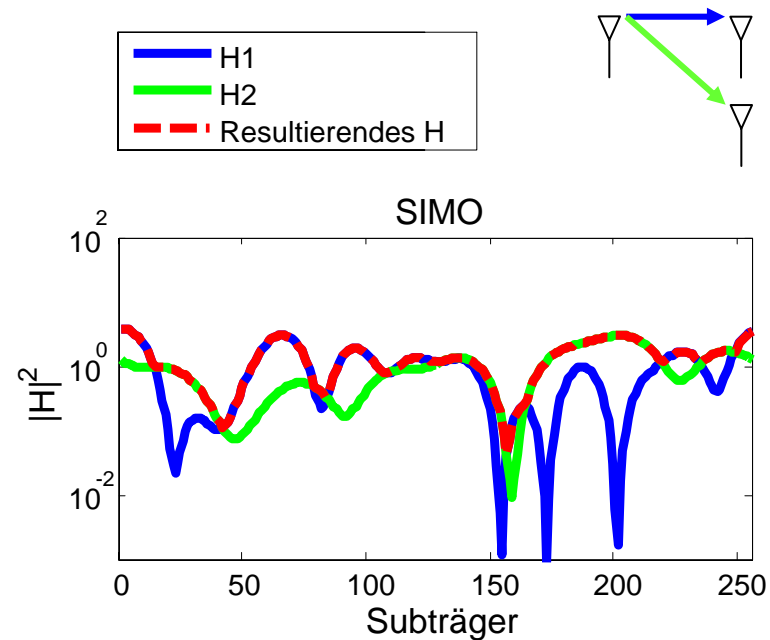
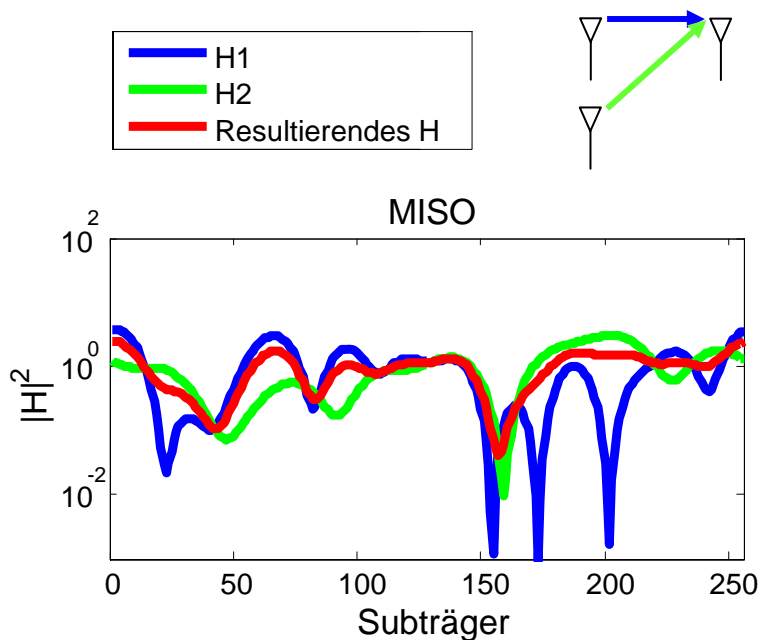
Sender: SISO- und SIMO-Systeme  
MISO- und MIMO-Systeme



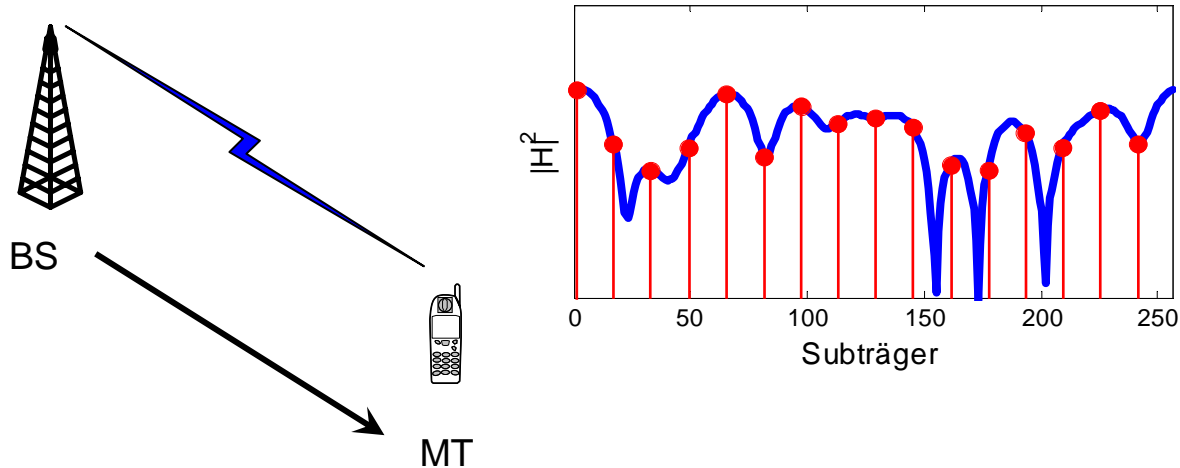
Empfänger: SISO- und MISO-Systeme  
SIMO- und MIMO-Systeme



# Räumliche Diversität

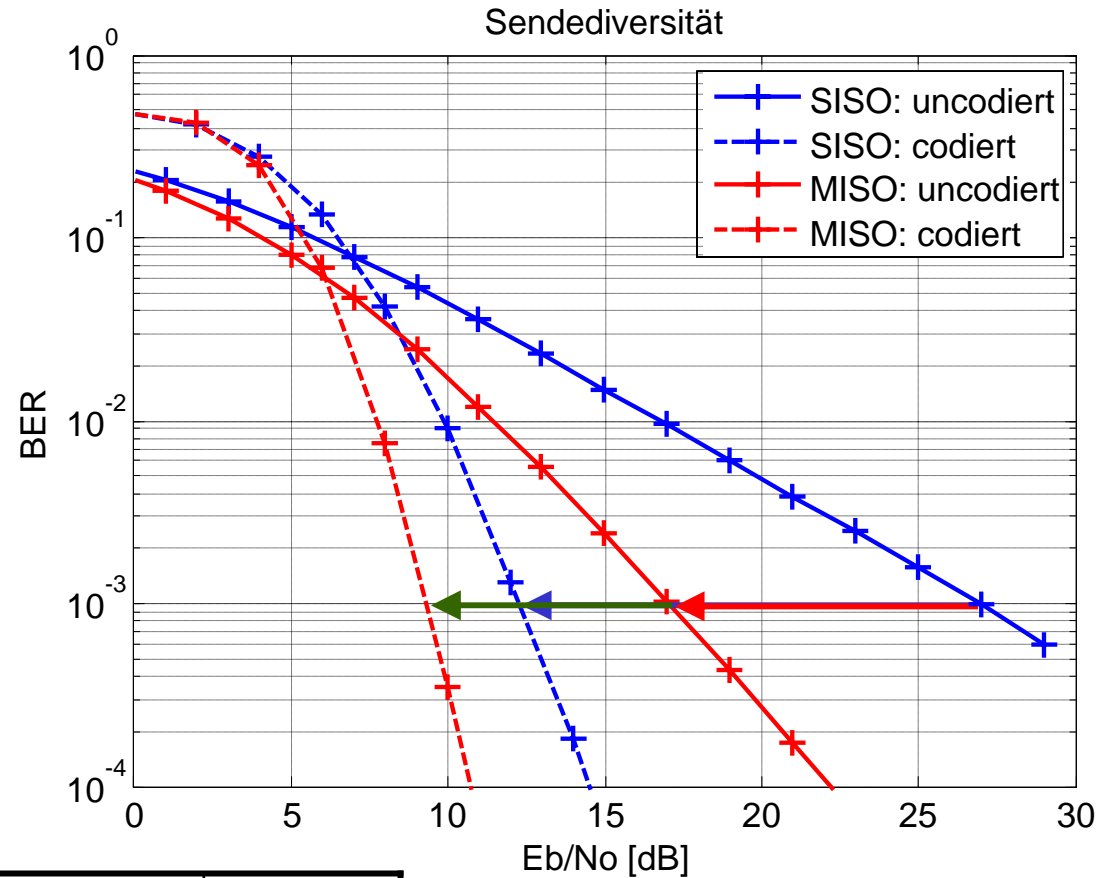
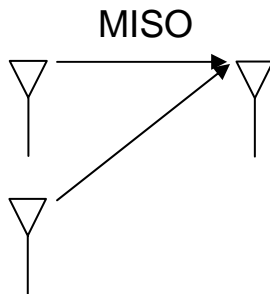
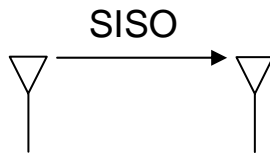


# Simulationsergebnisse



OFDM Parameter	
Trägerfrequenz	2,4 GHz
Bandbreite	20 MHz
Anzahl der Subträger	256
Anzahl der Subträger pro Nutzer	16
Modulation	DQPSK, QPSK (DSTBC)
Interleaver	Random
Fehlerschutz	Faltungscodierung, R=1/2, Einflußlänge 7

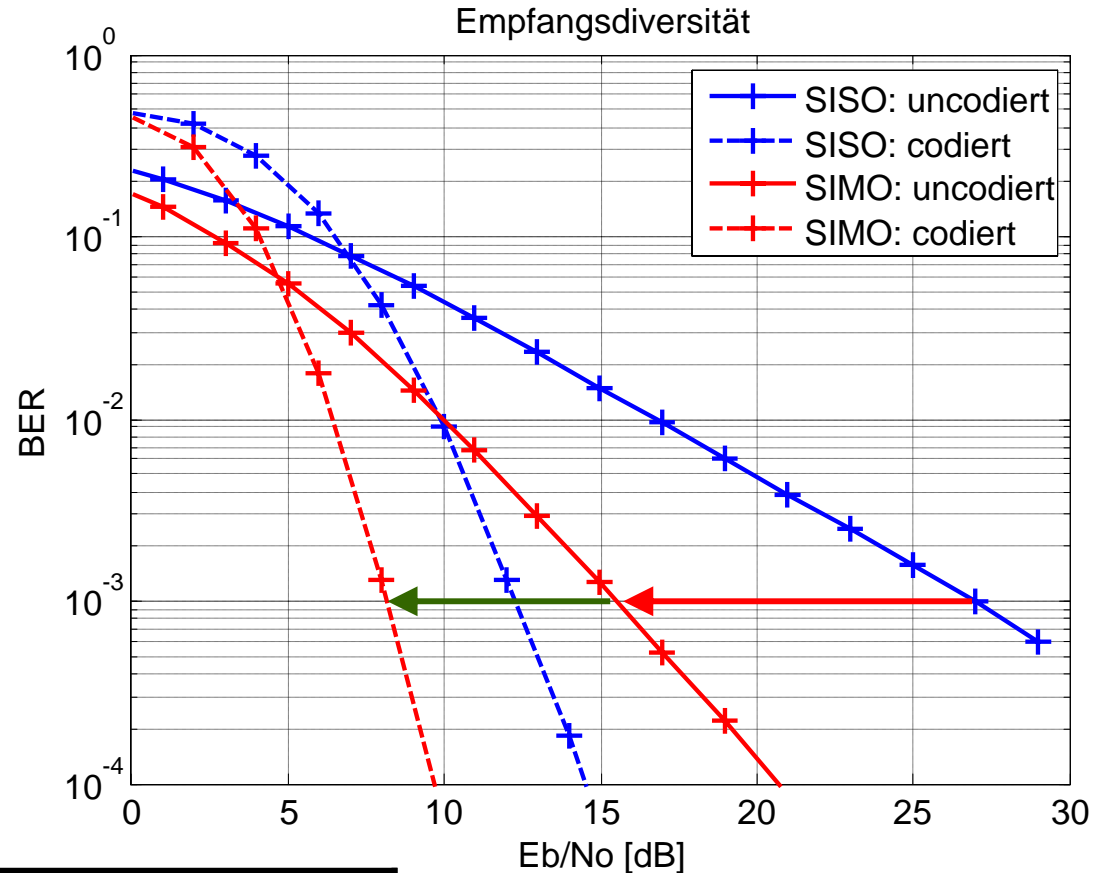
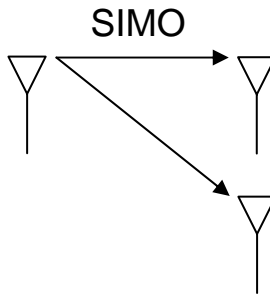
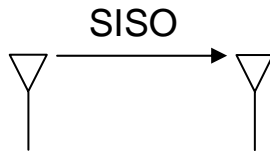
# MISO- versus SISO-Systeme



System	Diversitätsgewinn	Codierungsgewinn	Systemgewinn
SISO	0 dB	14.75 dB	14.75 dB
MISO	10 dB	7.5 dB	17.5 dB

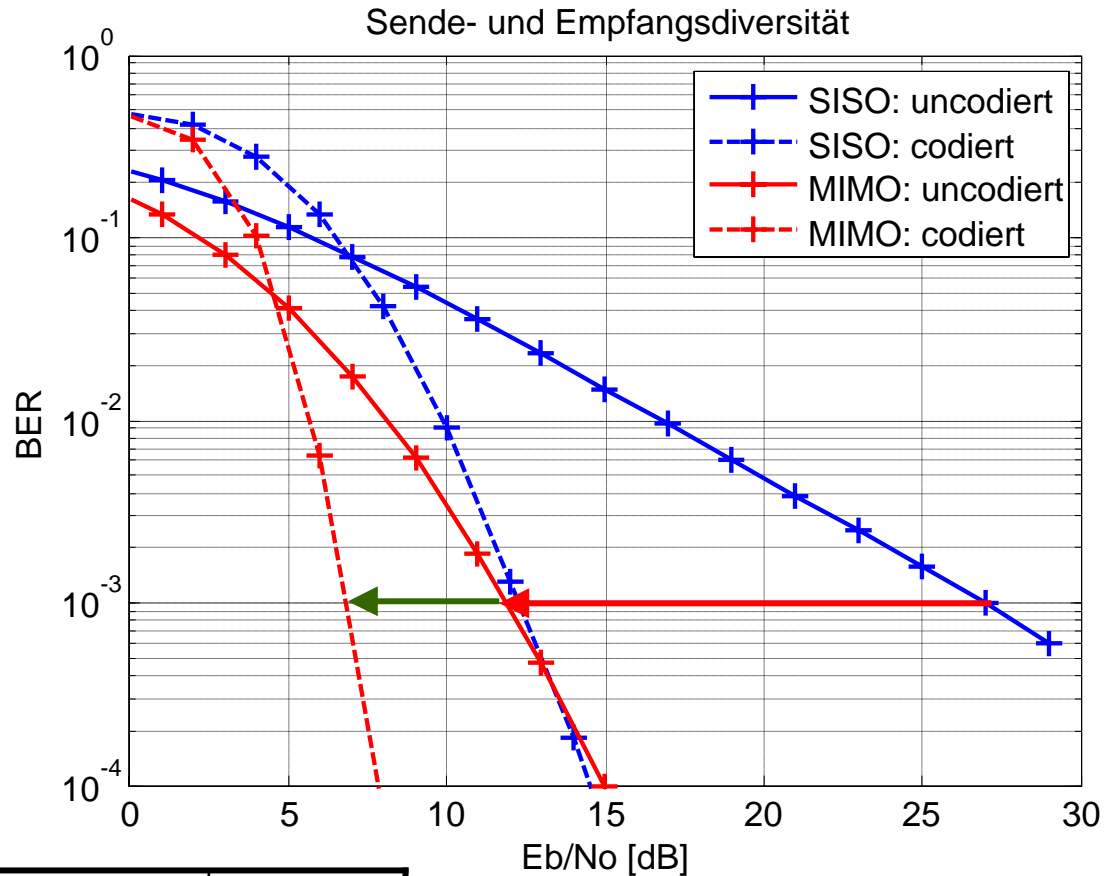
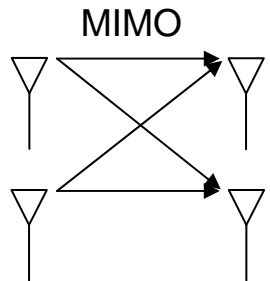
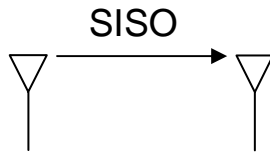


# SIMO- versus SISO-Systeme




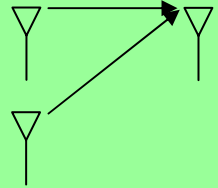
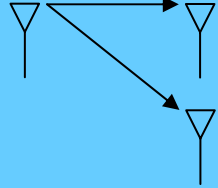
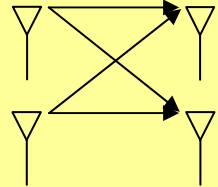
System	Diversitätsgewinn	Codierungsgewinn	Systemgewinn
SISO	0 dB	14.75 dB	14.75 dB
SIMO	11.5 dB	7.25 dB	18.75 dB

# MIMO- versus SISO-Systeme



System	Diversitätsgewinn	Codierungsgewinn	Systemgewinn
SISO	0 dB	14.75 dB	14.75 dB
MIMO	15 dB	5.25 dB	20.25 dB

# Fazit

System	Diversitätsgewinn	Codierungsgewinn	Systemgewinn
<b>SISO</b> 	0 dB	14.75 dB	14.75 dB
<b>MISO</b> 	10 dB	7.5 dB	17.5 dB
<b>SIMO</b> 	11.5 dB	7.25 dB	18.75 dB
<b>MIMO</b> 	15 dB	5.25 dB	20.25 dB

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**Vielen Dank für Ihre Aufmerksamkeit!**